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TROPICAL DISEASES BULLETIN

Vol. 2. 1913. No. 1.

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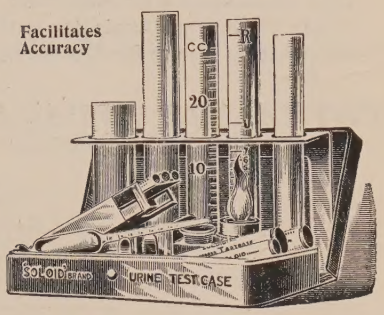

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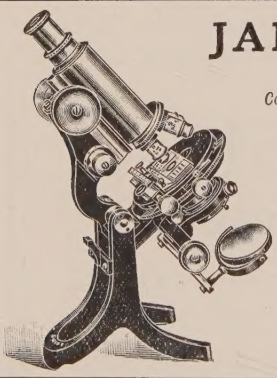

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 2.] 1913. [No. 1.

TYPHUS.

BURNS (Wm. C.). **A Recent Outbreak of Typhus Fever.**—*Hospital.* 1913. Feb. 8. Vol. 53. No. 1388. pp. 509-511.

The author describes an outbreak of typhus occurring in Eriskey, a small island of the Outer Hebrides. Thirteen years previously there had been an epidemic of typhus in the island and, among others, all the inmates of one house had perished. The succeeding tenant, fearing to occupy this house, built a new abode, leaving the old one in disuse. The kitchen midden of this old house, a shallow mound chiefly composed of peat ashes, had lain undisturbed during those thirteen years. On this occasion, however, the woman of the new house dug up the old midden and spread the ashes on her potato patch as manure. Within fourteen days she was down with typhus fever and all the other cases were proved "contacts" from this. The kitchen midden was situated on a small mound within a few yards of the seashore, drenched with salt spray during the greater part of the year, and at all times fully exposed to the action of the sun, wind, and rain.

The author remarks that the conditions under which this outbreak occurred show that the virus of typhus is capable of surviving for indefinite periods, in positions and under conditions that would seem entirely to preclude the agency of lice.

There were in all ten cases with three deaths. The fatal cases were in people of 49 years and over; the survivors 31 and under.

[Assuming that this outbreak was correctly diagnosed as typhus, it is certainly difficult to see any manner in which lice could have been responsible for the infection. However, body lice are said to be very much in evidence in some of the houses of this locality, and if any case of typhus had been introduced, there would be ample opportunities for its spread by the agency of these insects. It is certainly almost impossible to conceive that such a fragile virus as that of typhus is capable of surviving for thirteen years in a midden exposed to the conditions described by the author.]

E. Hindle.

(30014—2.) Wt. P 449—88. 1800. 5/13. D & S.

MOLODENKOFF (A.). **Das Fleckfieber bei Kindern nach dem Material des Morosoffschen Kinderkrankenhauses in Moskau während der Epidemie des Jahres 1911.** [Typhus in Children at the Morosoff Children's Hospital, Moscow, during the Epidemic of 1911.]—*Arch. f. Kinderheilkunde.* 1912. Dec. 10. Vol. 59. Nos. 3-4. pp. 199-233. With 14 curves: also (in Russian) in *Meditsinskoe Obozrainie.* Moscow. 1912. Vol. 77. No. 10. pp. 958-983.

The author has made a very careful study of the occurrence and symptoms of typhus amongst children. During the year 1911, 115 cases of typhus in children of from one to fourteen years of age were observed in the Morosoff Hospital at Moscow. In all the disease ran a very mild course and not one died from it, although the general mortality during this epidemic was about eight per cent. Infants seem to possess a natural immunity against the infection which gradually diminishes as they grow older and the author brings forward both statistical and clinical observations in support of this view. Thus not a single case of typhus was noticed amongst children less than one year old and only seven amongst those of one to three years. Moreover the severity of the attack was directly proportional to the age of the children, the mildest cases occurring among the youngest children and the most severe amongst the elder ones.

The author gives very detailed accounts of the clinical symptoms of the disease in children, for which the reader should refer to the original paper. In conclusion some notes are given on the epidemiology and mode of infection of typhus.

Typhus is a disease of the lowest classes, arising in districts where people are crowded together in the absence of any hygienic conditions; only under these circumstances does it ever assume the proportions of an epidemic and it always disappears under improved surroundings. Although there is little danger of direct infection from typhus patients when the latter are kept under hygienic conditions, any contact with unwashed patients or their clothes or bedding is very dangerous, as shewn by the number of cases occurring amongst washerwomen, porters, hospital attendants, etc. Finally, the author shews how well the epidemiology of typhus agrees with the view that the disease is transmitted entirely by parasitic blood-sucking insects.

E. H.

CARLAN (Decio). **El Tifus Exantemático en Madrid.** [Typhus Fever in Madrid.]—*El Siglo Medico.* 1913. Apr. 5. Vol. 60. No. 3095. p. 209.

The author protests against the exaggerations of the Press regarding the present epidemic of typhus fever in Madrid. He points out that the disease is restricted to the poorer quarters of the town and that during the past fifteen days there have only been about 100 cases out of a population of 600,000. Moreover the epidemic is not increasing and there is every hope of it soon disappearing.

E. H.

LEE (Roger I.). **Typhus Fever (Brill's Disease) at the Massachusetts General Hospital in Ten Years (Oct. 1, 1902 to Oct. 1, 1912).**—*Boston Med. & Surg. Jl.* 1913. Jan. 23. Vol. 168. No. 4. pp. 122-127.

During the past ten years the author has studied all the cases at the Massachusetts General Hospital that had been clinically diagnosed as typhoid fever or cases of fever without definite etiology. As a result it is shown that during this period typhus fever, in a mild and sporadic form, has been present in Boston and its vicinity, occurring in the ratio of about one case of typhus to 47 cases of typhoid fever. In all, 28 cases were observed that corresponded fairly well with BRILL's description of the disease and in all these patients both Widal's reaction and blood cultures gave negative results. The majority of these cases were in persons of Russian nativity, strongly suggesting that the disease was originally imported from Russia. It is interesting to note that, as in BRILL's cases of typhus, the records of the patients do not show any constant infection with lice.

E. H.

PAULLIN (James Edgar). **Typhus Fever with a Report of Cases.**—*Southern Med. Jl.* 1913. Jan. Vol. 6. No. 1. pp. 36-43. With 5 charts.

In this paper the author describes six cases of typhus occurring in Atlanta, Georgia. Detailed clinical symptoms are given and also the temperature charts of five of the patients.

The symptoms in all cases were typical of rather mild attacks of typhus. Repeated attempts to obtain the Widal reaction with *B. typhosus* and *B. paratyphosus* gave entirely negative results. Blood cultures were made in all except the first two cases, but all remained sterile. None of the patients suffered from any relapses and there were no complications.

[The remarkable mildness of many of the typhus epidemics of America is worthy of notice, and led BRILL to regard it as a separate disease. Subsequent investigations, however, have shown that "Brill's disease" is identical with typhus and the observations of Paullin clearly prove that this disease is endemic in the United States.]

E. H.

GOLDBERGER (Joseph). **Typhus Fever and Typhoid Fever. A Report on Papers read at the Southern Medical Association Meeting at Jacksonville, Fla., November 12-14, 1912.**—*U.S. Public Health Rep.* 1913. Jan. 10. Vol. 28. No. 2. pp. 63-64.

In this note the author calls attention to PAULLIN's paper (see above) recording the occurrence of typhus fever in Atlanta, Georgia, a record that is of great practical importance as it confirms the view that typhus is endemic in the United States of America.

E. H.

ANDERSON (John F.) & GOLDBERGER (Joseph). **Studies on Immunity and Means of Transmission of Typhus.**—*U.S. Hygienic Laboratory Bull.* No. 86. 1912. Oct. pp. 81-138.

The present bulletin consists of a collection of studies on typhus, most of which have been previously published in various journals. A condensed account of the first part of the section on immunity and means of transmission of typhus (in monkeys) has also been previously published under the title of "Natural and Induced Immunity to Typhus Fever."

In the present article charts are given of many of the cases previously described and for the author's conclusions the reader is referred to the account of the previous paper (see this *Bulletin* Vol. 1, p. 401).

In addition the authors attempted to infect both guinea-pigs and rabbits with typhus. The guinea-pig is susceptible, reacting in essentially the same way to an inoculation with typhus blood as does the monkey. One attack confers immunity from a second. A very small proportion of rabbits may also be susceptible but the results are inconclusive.

A number of experiments were performed with animals immune to other diseases and as a result it is shewn that the immunity conferred by an attack of typhus is specific.

The preventive action of immune serum in monkeys is shewn in a number of experiments. Thus typhus-immune serum obtained between the fifth and fourteenth day of convalescence has protective value when injected simultaneously with, or within 48 hours after, the inoculation of the virus. Immune serum obtained on the thirtieth day of convalescence seems to have no appreciable protective influence. When immune serum and virus are inoculated simultaneously, no immunity results, but when the serum is injected 48 hours after the virus, an immunity, probably active in nature, may perhaps result. It is evident, however, that the therapeutic value of immune serum is at best slight, and at the present time of no practical importance. In addition vaccination with crushed lice suspension, heated to 60° C. for 30 minutes, was attempted with negative results.

The experiments on the transmission of typhus by the body-louse are in continuation of the work of RICKETTS and WILDER and also NICOLLE, COMTE and CONSEIL. The bite of the body-louse may perhaps be infective within four days after the infecting feed. An attempt to inoculate a monkey with typhus by means of freshly hatched body-lice, the offspring of infected parents, gave entirely negative results and therefore satisfactory evidence of the hereditary transmission of the virus in the louse remains to be adduced.

Attempts to transmit the disease by means of the bites and subcutaneous injection of crushed bed-bugs were unsuccessful and these results are in harmony with the epidemiological characters of the disease.

One experiment was performed to test the infectivity of the buccal and pharyngeal secretions in cases of typhus. The

experiment shewed that they were not infective and the authors consider, therefore, that droplet infection plays no part in the transmission of this disease.

E. H.

ANDERSON (John F.). **Some Recent Work on Measles and Typhus Fever.** (Proceedings of the Johns Hopkins Medical Society 1912, Dec. 2.)—*Bull. Johns Hopkins Hospital.* 1913. Apr. Vol. 24. No. 266. pp. 121-124.

The author give a general discussion of certain advances in our knowledge of the communicable diseases, followed by an account of some recent work on measles and typhus fever, especially that done by GOLDBERGER and himself (see this *Bulletin,* Vol. 1, pp. 401-402). The paper contains nothing new.

E. H.

RABINOWITSCH (Markus). **Ueber die Empfänglichkeit der Ferkel für Flecktyphus.** [The Susceptibility of Young Pigs to Typhus.]—*Arch. f. Hygiene.* 1913. Vol. 78. Nos. 4-5. pp. 186-192.

The author briefly mentions that both rabbits and guinea-pigs may be infected with typhus by the injection of either the blood from a typhus patient, or cultures of *Diplobacillus exanthematicus.* In both these animals the symptoms of the disease are very slight and therefore experiments were made in order to find some more susceptible species. With this object two four-day old white pigs were injected with cultures of *Diplobacillus exanthematicus.* The first pig was injected with a one-month old culture and after an incubation period of only four days developed a typical attack of typhus. On the seventh day after the inoculation small petechiae developed on the belly of this animal and during the next two days became very numerous and spread to other parts of the body, so that the whole skin was covered by a typical exanthem. On the sixteenth day the petechiae had very much diminished in number and by the twenty-first had completely disappeared.

The second pig was injected with a three-months old culture. The exanthem was not developed until the fifteenth day after inoculation and was much less intense than in the other pig, and was only present for four days. In both animals the examination of the blood revealed the presence of *Diplobacillus exanthematicus.*

It appears, therefore, that young pigs are very susceptible to typhus, and that the injection of cultures of *Diplobacillus exanthematicus* is followed by the development of the typical exanthematous eruption.

E. H.

MALARIA.

HERMS (William B.). **Malaria: Cause and Control.** xi + 163 pp. With 30 text-figs. 8vo. 1913. New York: The Macmillan Company. [6*s*. 6*d*. net.]

The author commences his book by discussing the economic loss due to malaria in the State of California. The Board of Health there estimates that the annual loss amounts to $2,820,400. He gives a list of the Anopheles mosquitoes found in California and states that *Anopheles maculipennis* is the most frequent carrier of malaria. A clear and short account is given of the malarial parasite in the human host and in the mosquito. He describes the life history and habits of the mosquito and gives an account of the antimosquito campaigns employed in the several districts in California. He finds that malaria is the principal cause of absences from the rural public schools in the greater part of the malarial infested districts. Three-fourths of the malaria in California is found in nine out of the 24 malarial counties. The book contains useful information regarding the methods of conducting an antimalarial campaign in districts containing an intelligent white population.

D. Thomson.

SOUTHERN MEDICAL ASSOCIATION. **Preliminary Report of the Commission of the Southern Medical Association for the Study and Prevention of Malaria, Year ending November 4, 1912.**—*Southern Med. Jl.* 1913. Apr. Vol. 6. No. 4. pp. 219-226.

The Commission reports the existence of all three kinds of malaria in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, N. Carolina, Oklahoma, S. Carolina, Tennessee, Texas and Virginia. Benign tertian is most prevalent in the more northern States while malignant tertian is more common in the south. Pernicious malaria is reported in all. So far as can be ascertained from reports of the local practitioners, the number of cases of malaria varies from 25 to 800 per 1,000 of the population, according to the county or state.

Antimalarial measures:

1. Apparently no official steps have been taken to make a study of the Anophelines in any of the States.
2. The percentage of houses screened in 15 districts reporting malaria varied from 10 per cent. or less in country areas to 95 per cent. in the larger cities.
3. Drainage and oiling is carried on in one-third to one-half of the infected counties.
4. In 76 per cent. of the infected areas patients suffering from malaria are unscreened and therefore may be frequently a source of infection to mosquitoes.
5. Quinine prophylaxis is resorted to in only 39 of 155 infected counties and in only 3 districts is any attempt made to diagnose and treat latent malaria or malarial carriers.

6. In more than half of the infected counties no public instruction is given.

7. Quinine and calomel is the staple treatment. In about 90 per cent. of the reports, however, it is stated that this treatment is pursued only while the symptoms of malaria are present.

An estimate of the number of cases, deaths and economic loss from malaria annually in certain of the Southern States.

Summary of Estimate.

State.	Deaths.	Cases.	Total Cost.
			$
Alabama	1,222	122,200	3,666,000
Florida	307	30,700	921,000
Georgia	1,194	119,400	3,482,000
Kentucky	374	37,400	1,122,000
Louisiana	160	16,000	480,000
N. Carolina	538	53,800	1,614,000
S. Carolina	463	46,300	1,389,000
Tennessee	629	62,900	1,887,000
Texas	362	36,200	1,086,000
Virginia	407	40,700	1,221,000
	5,656	565,600	16,868,000

D. T.

VON EZDORF (R. H.). i. **Malarial Fevers in Alabama. A Study of the Prevalence and Geographic Distribution of the Disease throughout the State during the Calendar Year 1912.**—*U.S. Public Health Rep.* 1913. Apr. 4. Vol. 28. No. 14. pp. 641-644. With map.

ii. **Preliminary Studies of Malarial Fevers in Alabama.**—*Southern Med. Jl.* 1913. Apr. Vol. 6. No. 4. pp. 226-229.

i. The author gives a map of Alabama with its counties showing the distribution of deaths from malaria. The information was obtained by sending 2099 circular postal cards to the physicians in the State, calling for certain information regarding malarial fever. The number of replies received was 431.

The total number of deaths reported as due to malaria in the State for the year 1912 was 546. Of these 233 were in white and 313 in coloured people. 32·6 per cent. of this total of malarial deaths occurred in children in the first decade of life.

ii. The author's studies include statistical, epidemiological and scientific observations. His conclusions are as follows:—

"1. All forms of malarial fevers prevail in the State of Alabama.

"2. The types of infection, in the order of prevalence, are: Tertian, aestivo-autumnal, and quartan.

"3. The colored race is a large factor in the spread of infection, in whom the chronic type of malarial infection is proportionately greater than in the whites.

"4. To obtain the index of infection in a community, a blood examination should be made of adults as well as children of those who are permanent residents of such locality.

"5. Latent or known chronic cases should be treated vigorously for at least one month, and then with prophylactic doses of quinine for the period from April to November.

"6. Prophylactic doses of quinine should be taken by all persons in Alabama living in the localities known to be infected, between the period of April 1 to November 1. The prophylactic dose advised and used by me is 10 grains of quinine sulphate, given in 5-grain doses morning and evening, every Saturday and Sunday of the week.

"7. The microscope should be more generally used for making the diagnosis or confirming the diagnosis of malaria, or if practicable, advantage should be taken of the State Laboratory where examinations of blood will be made."

D. T.

KAUFMANN (J. B.). **Account of an Outbreak of Malaria on the U.S.S. "Tacoma" resultant upon a Visit to Tampico, Mexico.**—*U.S. Naval Med. Bull.* 1913. Apr. Vol. 7. No. 2. pp. 301-302.

This outbreak of malaria on board the U.S.S. "Tacoma" comprised 96 cases, 7 being readmissions; 39 were benign tertian and 57 malignant tertian. The first of the cases appeared 15 days after the arrival of the vessel in Tampico. It is interesting to note that this outbreak occurred despite the fact that the sailors were given 10 grains of quinine daily as a prophylactic from the day the vessel arrived in that port. Later the amount of quinine was reduced to 5 grains daily and 10 grains once a week. Mosquito nets were used at night but the men were bitten severely by mosquitoes in the afternoon while at work. A total of 333 days of sickness was caused by this outbreak. The vessel remained only 17 days in Tampico.

D. T.

BEACH (T. B.) & LEESON (H. H.). **An Outbreak of Malaria in "F" Company, 2nd Devon Regiment.**—*Jl. R. Army Med. Corps.* 1913. Apr. Vol. 20. No. 4. pp. 450-452. With 1 chart.

The authors describe an outbreak of 17 cases of malaria in "F" Company, 2nd Devon Regiment. The disease had been contracted in Cyprus at a place called Zeegoe where the men were badly bitten by mosquitoes. Next day they embarked for Alexandria. The fever outbreak commenced about 12 days later. Quartan parasites were found in three of the cases, and malignant tertian ring forms in two cases. The disease responded readily to quinine treatment.

D. T.

EXPERIMENTAL.

RIEUX (J.). **Mode d'Action de la Quinine sur *Plasmodium vivax* (var. *magna* du Prof. Laveran) de la Tierce et de la Double-Tierce bénigne de Rechute.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 153-156.

The author observed the effect of quinine in a number of cases of benign tertian malaria, some of which were double tertian and some relapses. Basic hydrochlorate of quinine was used in all the experiments in doses of 0·25 grammes four times daily at 6 a.m., noon, 6 p.m. and midnight. The blood smears were

fixed for 10 minutes in absolute ethyl alcohol and stained with Giemsa, 1 in 10, for 10 minutes. No cover glasses or Canada balsam were used. The technique in all the experiments was identical. His observations were as follows:—

(1) When the quinine administration was commenced during the febrile attack, i.e. when the schizonts were very young, it was noticed that their development became arrested, some showed no increase in size after 24 hours, and those which did grow showed true degenerative changes indicated by difficulty in staining of the protoplasm, which remained sometimes almost invisible. The nuclear chromatin persisted sometimes in the form of a single granule, sometimes it was polymorphic in character with various shapes. The clear area around the chromatin disappeared. The infected corpuscles showed occasionally a marked total or central decolorisation. Those young schizonts which were arrested in their development and degenerated disappeared totally from the peripheral blood in 48 hours from the commencement of the treatment.

(2) If the quinine administration was commenced the day after the access of fever when the schizonts were therefore half grown, they also had their further development arrested, but this did not occur in all of them, some being able to continue their growth to sporulation. Those which were killed showed the same signs of degeneration described, viz.: inability of the protoplasm to take up the stain (sometimes it was broken up into two or four portions), fragmentation and irregularity in the shape of the chromatin, and decolorisation of the containing corpuscles. The Schüffner's granules also seemed to be finer and less numerous than normally. These degenerated parasites disappeared later from the blood, without one being able to detect the details of their disappearance.

(3) When the quinine was given in the above doses at the time of the development of sporulating forms, it was noticed that they showed no appreciable degenerative changes and sporulated normally, causing an attack of fever.

(4) The action of the quinine on the gametes was less rapid, but it caused in them also a degeneration similar to that in the schizonts and they finally disappeared under the prolonged action of the drug.

D. T.

THOMSON (John Gordon) & THOMSON (David). **The Cultivation of one Generation of Benign Tertian Malarial Parasites (*Plasmodium vivax*) in Vitro, by Bass's Method.**—*Ann. Trop. Med. & Parasit.* 1913. Mar. Vol. 7. No. 1. pp. 153-164. With a plate by H. B. FANTHAM, and 1 chart.

The authors succeeded in cultivating the benign tertian malarial parasite on two occasions. They draw the following conclusions from their cultivation experiments regarding the benign tertian and malignant tertian parasites.

"(1) The benign tertian malarial parasite is capable of being cultivated up to the stage of sporulation, for at least one generation.

"(2) In our cultures the growth of the parasite from young rings to sporulating forms took place more rapidly than in the blood of the patient.

"(3) The cultures of benign tertian differed from those of malignant tertian in that there was no tendency to clumping of the parasites in the former, either before or during sporulation.

"(4) This difference appears to us to explain in a satisfactory manner why only young forms of malignant tertian are found in the peripheral blood, as the clumping tendency of the larger forms causes them to be arrested in the finer capillaries of the internal organs. It also explains the tendency to pernicious symptoms, such as coma, in malignant tertian malaria. All stages of the benign tertian parasite are found in the peripheral blood, and there are seldom pernicious symptoms, because there is no tendency to clumping.

"(5) Heavily pigmented, compact parasites were found in our cultures of benign tertian on the fifth day. On the eighth day these had grown larger, and their appearance suggested the development of gametocytes.

"(6) The malignant tertian parasite (*P. falciparum*) is capable of producing, in maximum segmentation, thirty-two spores. On the other hand, benign tertian (*P. vivax*) produces, as a rule, during maximum segmentation, sixteen spores; sometimes more may be produced, but the number is never thirty-two.

"(7) The pigment in *P. falciparum* collects into a definite, circular, and very compact mass early in the growth of the parasite. On the other hand, during the growth of *P. vivax* the pigment remains scattered in definite granules throughout the body of the parasite, till just before segmentation, when it collects into a loose mass of granules in the centre of the full-grown *Plasmodium*."

D. T.

CANTIERI (Collatino). **Le Sieroreazioni per il Tifo (Vidal), paratifi, Bacterium coli e Melitense (Wright) col Siero di Sangue Malarico.** [The Sero-Reaction for Typhoid, Paratyphoid, *Bacillus coli* and *Micrococcus melitensis* with Malarial Blood Serum.]—*Riv. Crit. di Clin. Med.* 1913. Mar. 15. Vol. 14. No. 11. pp. 161-168.

The author states that MENNELLA found a positive Widal reaction with malarial blood serum. STEFANELLI found the Wright reaction positive in ten per cent. of various infections including some cases of malaria. BIRT and LAMB however found this reaction always negative in twenty cases of malaria, while GARDEN found it always negative in 122 cases of typhoid, malaria, tuberculosis, etc. In his own experiments the author used an emulsion of *Micrococcus melitensis* made from an 8 to 24 hours' growth on agar. The other germ emulsions were made from 24 hours' cultures in broth media. In 58 malaria cases (17 primary infections; 32 relapses; undetermined 3, and malarial cachexia 6) these sero-diagnostic tests under the most varied conditions were negative.

D. T.

TREATMENT.

REED (E. U.). **A Case of Malaria treated with Salvarsan.**—*U.S. Naval Med. Bull.* 1913. Apr. Vol. 7. No. 2. pp. 255-256.

The author describes a case of benign tertian malaria in a seaman. This patient had three severe relapses although he had received two months treatment with large doses of quinine sulphate after the first two. [The exact dosage is not given.] The third relapse was treated by an injection of 0·6 grams of salvarsan into the buttock. The fever abated next day and no further relapse occurred in the year following.

D. T.

PROPHYLAXIS.

CORVINO (Raffaele). **Lotta Antimalarica in Cancello ed Arnone.** [Antimalarial Campaign in Cancello and Arnone, (Province of Caserta, Italy).]—*Propaganda Antimalarica.* 1912. Dec. 31. Vol. 5. No. 6. pp. 136-139.

The locality in question was so infested with malaria during 1895-1900 that in August there was not a single person who was not infected. Owing to the labours of the author circumstances have gradually improved, so that now no case of pernicious malaria has been seen for the last five years. He thinks that this result is due principally to the administration of state quinine.

D. T.

CACACE (Ernesto). **Educazione Antimalarica e Profilassi Antimalarica Scolastica in Italia nel 1911.** [Antimalarial Education and Prophylaxis in the Schools in Italy during 1911.]—*Propaganda Antimalarica.* 1912. Dec. 31. Vol. 5. No. 6. pp. 131-136.

The author shows that the results obtained from antimalarial instruction in the schools, by the workers in the various districts, are very favourable. He again urges the authorities to make this school instruction compulsory in Italy.

D. T.

TIMPANO (Pietro). **Profilassi Antimalarica nelle Scuole Elementari di Bova Marittima nel Biennio 1911-12.** [Antimalarial Prophylaxis in the Elementary Schools of Bova Marittima (Calabria) 1911-12.]—*Propaganda Antimalarica.* 1913. Feb. 28. Vol. 6. No. 1. p. 20.

In 1911, 40 pupils received state quinine [dose not stated] from May 15th to August 31st, and they had no fever. In 1912, 29 boys between eight and twelve years of age, coming from the worst malarial focus, received state quinine during June and July in the afternoons before going home. The success of this medication was complete. The author thinks that the free administration of quinine to school children, combined with simple and clear instructions as to the benefit derived from the quinine, would constitute the best antimalarial measure.

D. T.

SERGI (Antonio). **La Malaria nella Riviera Ionica Reggio—Gerace nel 1911.** [Malaria in the Ionic Riviera between Reggio (Calabria) and Gerace in 1911.]—*Propaganda Antimalarica.* 1913. Feb. 28. Vol. 6. No. 1. pp. 17-19.

The author states that the conditions of life and social hygiene in this area are very bad. His statistics however show a decrease in malaria from 11·34 per cent. of the total population in 1910 to 9·80 per cent. in 1911. In 1910 the maximum number of cases, 811, occurred in August and in 1911 the maximum occurred in

September (1,342 cases). He gives further data showing the number of people in receipt of prophylactic quinine and the number of cases, relapses, and deaths from malaria among these. The amount of quinine consumed in 1910 and 1911 was 80,616 grammes and 83,326 grammes respectively. Anophelines were more or less abundant from June to September.

D. T.

Rossi (Giacomo). **Sul Bonificamento definitivo della Piana di Fondi e Monte San Biagio.** [On the Definitive Drainage of the Piana di Fondi, etc.]—*Propaganda Antimalarica.* 1913. Feb. 28. Vol. 6. No. 1. pp. 1-17.

This paper is a dissertation on the possible difficulties which might arise in an attempt to drain the Piana di Fondi (Caserta, Italy) and Monte San Biagio. The author concludes that there should be practically no difficulty in making the lagoon permanently dry, and expresses the hope that the work, which has been tentatively taken up by many, will now finally be accomplished.

D. T.

Brünn (W.) & Goldberg. **Das Cisternenproblem bei der Bekämpfung der Malaria in Jerusalem.** [The Cistern Problem in Antimalarial Measures in Jerusalem.]—*Berlin. Klin. Wochenschr.* 1913. Apr. 7. Vol. 50. No. 14. pp. 639-640.

The authors made over 2,000 blood examinations in the Jewish quarters of Jerusalem and found that 21·5 per cent. of these showed malaria. Of 600 people 57 per cent. had splenic enlargement. They believe that badly constructed cisterns must be regarded as the main cause of this malaria, as they are a constant source of breeding of anopheline mosquitoes. The total abolition of these cisterns is not practicable, but the authors have substituted pumps in place of the bucket system, have closed all unnecessary openings and have designed effectual screening for those openings which are indispensable.

D. T.

Fróes (Joao A. G.). **Un Caso de Aphemia Transitoria Palustre. (Aphasia Motora Verbal, Funccional, de Origem Paludica.)** [A Case of Transitory Functional Motor Aphasia due to Malaria.]—Reprint from *Brazil-Medico.* 1912. [41 pp. Rio de Janeiro: Lyp. Bernard Frères.]

In this paper, read before the Bahia Medical Faculty, the author reports the following case in a native of Bahia, aged 34. The patient suffered from malignant tertian malaria and had numerous crescents in his peripheral blood. He was an alcoholic and syphilis was strongly suspected. He developed a complete verbal motor aphasia without agraphia. This aphasia was transitory and the author concludes that it was malarial in origin from microscopical examination of the blood and from the fact that it completely disappeared under quinine treatment.

He thinks that the aphasia in this case may have been due to parasitic thrombi in the speech centre of Broca, since it is well known that the malignant tertian parasites tend to accumulate and sporulate in the capillaries of the inner organs. The alcoholism and syphilis (suspected) may have further aggravated the tendency to capillary thrombosis due to the malarial parasites.

D. T.

FAZZARI (G. B.). **Malaria ed Epatite Suppurata.** [Malaria and Suppurative Hepatitis.]—*Malaria e Malat. d. Paesi Caldi.* 1913. Mar. Vol. 4. No. 2. pp. 77-79.

The author reports two cases of malignant tertian malaria with suppurative hepatitis. He aspirated 200 cc. of pus in each case. One died. There were no signs of dysentery or hydatids. He believes that the malaria was indirectly the cause of the suppuration by producing changes in the structure of the hepatic parenchyma, rendering the organ more susceptible to infection from suppurative germs, possibly *B. coli* or "*Streptococcus duodenalis.*" These germs increase in virulence owing to the devitalised condition of the intestine and other organs. They infect the bile passages or follow the course of the portal vein and are carried by the blood stream to the liver. [Were entamoebae excluded?]

D. T.

WILSON (F. E.). **Note on Three Cases of Splenic Abscess occurring in so-called "Malarial Cachexia."**—*Lancet.* 1913. Apr. 26. p. 1162.

The author states that he has been impressed with the frequency of splenic abscess occurring in cases of so-called malarial cachexia in Persia and by the disappearance of the cachexia on treatment directed against the local condition. He diagnoses such cases from the continuance of fever in spite of thorough quinine treatment, from local evidence of softening, pain or adherence of the spleen to the abdominal parietes, and from the existence of a leucocytosis. He operated on the three cases described; two benefited very markedly and one died. In one case 1½ pints of pus were evacuated, in the other 1¼ pints. Bacteria were found in the pus but no malarial parasites. [Cases of splenic abscess due to entamoebae have been described. Were they looked for in this case?]

D. T.

YELLOW FEVER.

SEIDELIN (Harald). **The Nature and Control of Yellow Fever.**—*Yellow Fever Bureau Bull.* 1913. Jan. Vol. 2. No. 3. pp. 255-271.

This is a paper which was read at the XVth International Congress on Hygiene and Demography at Washington in September, 1912, and consequently it contains much that has appeared since in the author's reports upon his yellow fever expeditions. In reference to the transmission of the disease the author states that "the axiom that yellow fever is transmitted by no other mosquito than *S. fasciata* is an assertion entirely without proof" and again "that yellow fever is transmitted in nature by no other means than by mosquitoes has never been proved, but is extremely probable in view of our knowledge of protozoal diseases." The paper commences with the statement that "Yellow fever is an infectious disease, produced by *Paraplasma flavigenum* and transmitted by *S. fasciata*" (but see this *Bulletin.* Vol. 1. pp. 246-249.

The author considers that the view that a period of twelve days incubation is necessary in the mosquito before it becomes infective "is likely to be correct but cannot be considered exclusively proved," and further that the view that yellow fever blood is infectious during the first three days of the disease only rests upon "very scanty evidence." The responsibility for this dogma, the author says, rests with MARCHOUX and SIMOND but "never has a dogma in medicine been established on evidence poorer than this." With the view that yellow fever is only transmitted at night he seems to agree and points out that MARCHOUX and SIMOND showed that *Stegomyia fasciata* feeds in the day time only at its first feed and takes its subsequent feeds at night time. Hereditary transmission in mosquitoes and infection of mosquitoes by feeding on sugar-water containing triturated, infected mosquitoes, have been observed by MARCHOUX and SIMOND in one experiment of each kind.

After giving a description of *Paraplasma flavigenum*, which the author considers to be the causative parasite of yellow fever, he goes on to explain that though the discovery of the mosquito transmission of the disease promised a speedy extermination of the outbreaks, this expectation has only been realised in such places as Habana, New Orleans, Panama Canal Zone, Rio de Janeiro and Vera Cruz, where powerful governments have been able to insist on prophylactic measures. Two most important points in the epidemiology of yellow fever are the existence of unrecognised and unrecognisable cases. It is asserted that the susceptibility of the individual diminishes with the length of time during which he has resided in a yellow fever infected country. This phenomenon cannot be explained unless it is admitted "that the (relative or absolute) immunity has developed as a consequence of acquired infection." This explanation is clear when applied to foreigners, and MARCHOUX and SIMOND, OTTO, BOYCE and others have extended the idea to explain the relative immunity of the native. Infection takes place in childhood, producing nearly always an atypical form of the disease. The child growing up is repeatedly bitten by infected Stegomyia which either

produce no disease or only a mild febrile disorder. Under such conditions many individuals act as microbe carriers and serve as the starting point of an epidemic when, for example, a large number of non-immunes are suddenly introduced to the district. Another factor which may influence the native susceptibility is, in the author's opinion, a certain degree of hereditary immunity, antibodies having passed from mother to child.

The author gives the following directions for the demonstration of his parasite in the peripheral blood of cases of the disease.—

"The demonstration of *P. flavigenum* is difficult; a very thorough examination of well prepared and intensely stained blood smears is necessary, and the best microscopic outfit is none too good. It is almost useless to work with an ordinary 1/12″ immersion lens; truly, I have often seen the parasites with such a lens, when I was aware of their existence and had localized them before, but for the detection of *Paraplasma* I consider an apochromatic immersion lens and compensating oculars a necessity. The examination should be repeated, if a negative result is obtained, and the case continues suspicious. My belief is that this means of diagnosis will become as essential in yellow fever as is the bacteriological examination in plague and cholera."

Under the heading of prophylactic measures the author considers the protection of mosquitoes against acquiring infection from human individuals and the protection of non-immunes against the bites of infected mosquitoes. This entails the destruction of adult mosquitoes, the prevention of their breeding, the early recognition and isolation of cases of the disease. The author then gives his views as to the measures which should be put into force in three illustrative cases, viz.:—Endemically infected places: exposed places; epidemic outbreaks. In the first case as indeed in all three, complete mosquito destruction is the ideal to be aimed at. In the second case anti-mosquito quarantine, consisting in the fumigation of all ships arriving from infected or suspected ports, must be undertaken unless it be shown by certificate that during its stay a safe distance of 200-500 metres from shore had been kept and that loading and unloading had been effected by means of mosquito-proof lighters. As regards passengers they should undergo an initial examination and sign a declaration that they will report to the health officer twice daily for two weeks. In event of any suspicious sign they could be isolated. This observation of passengers is, in the author's opinion, preferable to the real quarantine system. In the case of epidemic outbreaks the immediate undertaking must be the destruction of the adult mosquitoes together with the detection and isolation of the cases.

C. M. Wenyon.

White (Joseph H.). **The Dissemination and Prevention of Yellow Fever.**—*Amer. Jl. of the Med. Sciences.* 1913. Mar. Vol. 145. No. 3. [No. 492.] pp. 378-386.

The author points out that, though it has been demonstrated that yellow fever is transmitted by *Stegomyia calopus*, some still cling to the idea that the disease can be conveyed by fomites. The author shows how untenable this view is by reference to his hospital experience with yellow fever cases which were completely screened from mosquitoes without any precautions being taken against other possible means of spread of the infection.

He describes the habits of the *Stegomyia calopus* and points out that it is a domesticated mosquito which, when once it has taken up its abode in an inhabited room or house, seldom leaves it. The author is convinced that to become infected with yellow fever "one must enter a room, with a dim light, where yellow fever has been at least fifteen days before." Under certain exceptional circumstances the Stegomyia will leave the sick room but only when this is completely abandoned and left without water. With few exceptions the only breeding places of the Stegomyia are those receptacles, cisterns, containers, etc., which are the direct result of human habitation; but though this is the case, in yellow fever prophylaxis it is well to attack all mosquitoes alike, for it is just possible that the Stegomyia will be driven to breed elsewhere if it finds its breeding places of selection destroyed. In the case of fountains and similar collections of water the introduction of small fish is recommended. Roof gutters are a prolific source of danger, so that the ideal way is to dispense with these structures and allow the water to fall from the roof on to paved ground and thence flow away. In dealing with endemic centres, where naturally the measures adopted will extend over a considerable period of time, it is hardly possible or advisable to attack the adult mosquitoes themselves; but in an epidemic this is very important and one cannot too carefully isolate the sick man and his accompanying mosquitoes, which latter are to be destroyed by fumigation when the patient is removed to another house after the third day of his illness. Neighbouring houses if connected are to be treated also, but the author deems it unnecessary to fumigate neighbouring detached houses. A reference is made to the author's work in connection with the extermination of yellow fever in New Orleans which was commenced in August 1905. By the end of October there was a total elimination of yellow fever, nearly all Stegomyia and most of the Anophelines and Culicidae, and this in 44 square miles of territory with a population of 335,000 inhabitants who had presented to that time 600 cases of the disease.

C. M. W.

Bouet & Roubaud. Mission de la Prophylaxie de la Fièvre Jaune au Sénégal. Instructions relatives à la Lutte Antilarvaire. *Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 742-750.

In this paper the authors write that in an inspection of the various centres in Senegal, especially in the provinces of Cayor, Baol and Saloum where the Sanitary Service has been conducting antilarval measures, they have noted that in spite of all efforts the measures adopted have resulted in no decided improvement. They indicate that this failure is not due to any negligence on the part of those in charge of affairs but rather to a lack of knowledge of the mosquitoes and their habits.

The authors then review the best methods for finding the larvae of the various mosquitoes and the plan they have found most convenient and simple for carrying on the work of the hygiene brigade. As regards the larvae it is pointed out that these vary with the habits of the mosquitoes themselves, which are considered under the following headings:—(1) Mosquitoes of

[illegible] (2) Mosquitoes of large swamps and lagoons; (3) Mosquitoes of [illegible]; (4) Mosquitoes of domestic receptacles.

Under the first heading are considered the Anophelines, for they breed in pools of stagnant water in which algae grow and on the borders of which there is vegetation. In the second place the mosquitoes which frequent the large expanses of water, the margins of lagoons, deltas of rivers, are chiefly Mansonia. It is fortunate that these mosquitoes do not transmit either malaria or yellow fever, for they can be exterminated only by extensive irrigation works. Thirdly, certain mosquitoes breed in the small holes made by the terrestrial crabs which live near the sea or collections of brackish water. These can only be dealt with by petrolising such holes individually. Lastly the mosquitoes of domestic receptacles are the Stegomyia which are to be kept under by constant examination. A long list of the various situations in which these mosquitoes breed is added and it is pointed out that the mere emptying of an infested receptacle is not sufficient unless measures are taken to prevent water collecting again in a short time; for the eggs and larvae may survive if complete drying has not taken place. A section is devoted to the equipment and duties of an antimosquito brigade and the kind of inspection to be carried out in order to render effective the measures adopted.

C. M. W.

[illegible] Une Observation de Fièvre Jaune au Dahomey. [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1913. Jan.-Feb.-Mar. Vol. 16. No. 1. pp. 181-184.

[illegible] Observations de Fièvre Jaune au Sénégal. [Marque.]—*Ibid.* pp. 184-193.

The first note contains the description of a typical case of yellow fever which terminated fatally.

The second note describes three cases of the disease, two of which were fatal.

C. M. W.

West Africa. **Report on Certain Outbreaks of Yellow Fever in 1910 and 1911.**—1913. 108 pp. With 6 maps. London: Printed by Waterlow & Sons.

This interesting report was compiled by Drs. A. E. Horn and T. F. G. Meyer and is based on various reports received from the Colonies on the West Coast of Africa. It is full of matter of the utmost importance to those who will be called upon to combat yellow fever on the West Coast and to do justice to it in a short space is impossible. Details of 64 cases are given together with a minute account of the local conditions associated with their origin and the prophylactic measures adopted to check the spread of the disease. On pages 21 and 22 is to be found a tabular statement of the cases occurring in the years 1910 and 1911 and this is reproduced here.

There are spot maps of Freetown, Secondee, Accra and Bathurst, showing where the cases occurred and two maps of West Africa showing (*a*) the epidemics of 1910 and 1911, and (*b*) all recorded epidemics and the distribution of *Stegomyia fasciata*.

Tabular Statement of the Cases of Yellow Fever on the West Coast of Africa.

Place.	Case No.	Race.	Age.	Occupation.	Date.	Result.	Quinine Prophylaxis.	Blood examination for Malaria Parasites.	Remarks.
					1910.				
Freetown	1	Syrian ...	20	Trader ...	April 7–17 ...	Death ...	Probably No	Malignant Tertian	Malaria followed by Yellow Fever.
	2	Syrian ...	—	Trader ...	April 17 ...	Death ...	—	—	No details of illness.
	3	Syrian ...	23	Trader ...	May 4–5 ...	Death ...	Probably No	Negative.	
	4	Syrian ...	—	Trader ...	May 5	Death ...	—	—	No details of illness.
	5	Syrian ...	15	Trader ...	May 6–7 ...	Death ...	Probably No	Negative.	
	6	European	42	Agent ...	May 9–14 ...	Death ...	—	Negative.	
	7	Syrian ..	—	Trader ...	May 13 ...	Death ...	—	—	No details of illness.
	8	Syrian ...	25	Trader ...	May 18–25 ...	Death ...	Yes	Negative ...	Travelling in Protectorate before attack.
	9	European	50	Missionary ...	May 26–31 ...	Death ...	—	Negative ...	Ten years in West Africa.
	10	European	60	Trader ...	June 5–8 ...	Death ...	—	Not made ...	An ambulant case.
	11	European	28	Govt. Official	June 25–July 13	Recovery	Yes, regularly	Negative ...	Taken ill at Yonni in the Moyamba district; an ambulant case.
	12	European	30	Soldier ...	July 13–17 ...	Death ..	Yes, regularly	Negative ...	An attack of Malaria preceded the attack of Yellow Fever by seven days.
	13	Syrian ...	35	Trader ...	July 18–22 ...	Death ...	Probably No	Negative.	
	14	Syrian ...	—	—	July 26 ...	Death ...	—	—	The post-mortem, of which there are no records, was thought to confirm a diagnosis of Yellow Fever.
	15	Negro ...	23	Clerk ...	July 30–Aug. 2	Death ...	No	Not made.	
	16	Negro ...	24	Labourer ...	Aug. 1–5 ...	Recovery	No	—	
	17	European	25	Trader ...	Aug. 1–17 ...	Recovery	Yes, regularly	Negative ...	An ambulant case.
	18	European	27	Govt. Official	Aug. 11–20 ...	Recovery	Yes, regularly	—	
	19	Negro ...	34	Cook ...	Aug. 18–27 ...	Recovery	No	—	
	20	Negro ...	26	Labourer ...	Aug. 28–29 ...	Death ...	No	—	
	21	European	26	Clerk ...	Sept. 15–22 ...	Death ...	Irregularly ...	Doubtful ...	History of C_2H_6O; ambulant case.
Seccondee	22	European	29	Govt. Official	March 19–24 ...	Death ...	Regularly ...	—	
	23	European	30	Agent's wife	April 12–28 ...	Recovery	—	—	
	24	European	42	Agent ...	April 26–30 ..	Death ...	Not known ...	—	
	25	European	26	Govt. Official	May 8–10 ...	Death ...	Not known ...	—	
	26	European	25	Missionary ...	May 9–13 ...	Death ...	—	—	An attack of Urticaria preceded the Yellow Fever.
	27	European	45	Contractor ...	May 9–12 ...	Death ...	Not known ...	—	
	28	Negro ...	—	—	—	Death ...	No	—	Not a native of Seccondee.
	29	Negro ...	—	Labourer ...	May 16 ...	Death ...	—	—	Not a native of Seccondee.
	30	European	35	Contractor ...	May 18–21 ...	Death ...	Not known ...	—	Ambulant case.

	31	European	33	Accountant...	May 19–27 ...	Death ...	Yes, regularly	—	
	32	European	50	Missionary ...	May 20–23 ...	Death ...	Not known ...	—	Thirty years in Africa including leave.
	33	European	32	Govt. Official	May 22–25 ...	Death ...	Not known ...	—	
	34	Negress ..	—	—	May 23 ...	Death ...	—	—	
Sawmills	35	European	38	Clerk ...	July 15–19 ...	Death ...	Yes, regularly	—	
Axim ...	36	European	40	Merchant ...	July 12–15 ...	Death ...	Not known ...	—	
Lagos ...	37	Negro ...	30	—	July 28–29 ...	Death ...	—	Negative.	
	38	Negro ...	45	Labourer ...	Aug. 5–7 ...	Death ...	—	—	
					1911.				
Accra ...	39	European	—	—	Feb. 6–24 ...	Death ...	—	Negative.	
	40	European	—	Merchant ...	Feb. 17–19 ...	Death ...	Not known ...	—	
	41	European	24	Merchant ...	May 23–24 ...	Death ...	Yes, regularly	—	
	42	European	27	Merchant ...	May 23–27 ...	Death ...	Yes, regularly	Negative.	
	43	Negro ...	—	Labourer ...	May 24–31 ...	Recovery	No	Negative ...	Non-native of Accra, arrived there October 10th, 1910.
	44	Negro ...	30	Labourer ...	May 24–31 ...	Recovery	No	Negative ...	Non-native of Accra, arrived there in 1910.
	45	Negro ...	40	Clerk ...	May 25–June 3	Recovery	No	Negative.	
	46	European	35	Engineer ...	May 22–26 ..	Recovery	Not known ...	Negative.	
	47	European	35	Merchant ...	Aug. 26–Sept. 6	Death ...	—	—	
	48	European	29	Clerk ...	Dec. 20 ...	Death ...	Neglected ...	Not made ...	An ambulant case.
Avreboo	49	European	—	Agent ...	Dec. 20 ...	Death ...	—	—	
Bathurst	50	European	31	Govt. Official	May 19–23 ...	Death ...	—	Negative.	
	51	European	32	Govt. Official	May 19–22 ...	Death ...	Not known ...	Positive malignant tertian.	
	52	European	23	Clerk ...	May 20–June 2	Recovery	Regularly ...	Not made.	
	53	European	39	Servant ...	May 26 ...	Death ...	Not known ...	—	
	54	European	24	Engineer ...	May 26 ...	Death ...	Regularly ...	Not made.	
	55	European	30	Engineer ...	July 6–13 ...	Death ...	Not known ...	—	
	56	Syrian ...	26	Trader ...	July 11 ...	Death ...	Not known ...	—	
	57	European	27	Clerk ...	July 16–18 ...	Death ...	Irregularly ...	—	
	58	Syrian ...	21	Trader ...	July 15–24 ...	Recovery	Not known ...	—	
	59	European	28	Missionary ...	July 23 ...	Death ...	Regularly ...	—	
	60	European	29	Clerk ...	July 23 ...	Death ...	Irregularly ...	—	
	61	Syrian ...	23	Trader ...	July 24–28 ...	Death ...	Not known ...	Not made.	
	62	European	25	Clerk ...	Aug. 2–16 ...	Recovery	Irregularly ...	Not made.	
	63	European	26	Clerk ...	Nov. 11–17 ...	Death ...	Regularly ...	—	
	64	European	—	—	—	Death ...	—	—	

RICE (Thomas E.). **Evidence of the Endemicity of Yellow Fever in the Gold Coast Colony.**—*Yellow Fever Bureau Bull.* 1913. Jan. Vol. 2. No. 3. pp. 272-274.

The author reminds his readers that in 1910 he wrote that he considered yellow fever to be endemic amongst the native population of West Africa. He is still of this opinion and considers that no other hypothesis can explain the outbreaks. During the period March 1910-August 1912, 23 cases of the disease were reported amongst the non-immune European population of the Gold Coast and of these 22 were fatal. The logical deduction from this high death rate is that many mild cases must escape recognition. The small number of cases occurring at each outbreak is frequently raised as an argument against the existence of yellow fever in West Africa. This is explained by the fact that the bulk of the population consists of immune natives and that non-immune Europeans live in bungalows usually widely separated and not in crowded streets as they did in the historic epidemic in New Orleans. Yellow fever in West Africa is apt to be a bungalow or house disease rather than one attacking whole streets or districts.

In conclusion the author submits that for the following reasons yellow fever must be regarded as endemic on the Gold Coast.—

"(1) During the 1910 outbreak in Seccondee, fifty Europeans and 1,500 natives were resident in the infected area of Commerical Town, Seccondee.

Ten Europeans contracted the disease and nine died of it; not a single native died or showed symptoms of yellow fever. Therefore, presumably, the disease was endemic and the natives immune.

"(2) The European who was infected at Saw Mills Camp in 1910 had not been away from his station for three weeks. No cases were observed amongst the natives.

"(3) The European who died at Avibro in 1911 had not left his camp for a month. No cases occurred amongst the natives.

"(4) During the outbreaks at Accra during 1911 and 1912, eight Europeans contracted yellow fever, in each case with a fatal result. Whereas, during the same period ten natives were diagnosed with the disease in a mild form, and all recovered, a fact which points to their having acquired a partial immunity from previous infections."

C. M. W.

LICEAGA (Eduardo). **Annual Report on the Condition of Yellow Fever throughout the Mexican Republic.**—*Amer. Jl. Public Health.* 1913. Mar. Vol. 3. No. 3. pp. 263-264.

The period reported upon extends from November 25, 1911 to August 31, 1912.

There were sixteen cases of the disease with six deaths in Merida. The last case was seen on May 1st. Cases occurred at San Juan Bautista to the number of fifty with 22 deaths between May 1st and August 19th. A battalion of troops proceeding from San Juan Bautista to Frontera was isolated and two cases occurred during the isolation. The author remarks that if the circumstances prevailing have permitted the development of the two foci named it is to be expected that with the new plan of

campaign which is being put into practice the disease will be finally extinguished.

C. M. W.

GARCIA (Pedro). **Notas de Clinica Hematológica. La Neuva Etiologia de la Fiebre Amarilla. Epidemia del Yucatan.**—*Semana Medica.* 1913. Vol. 20. No. 2. pp. 61-67.

This paper is a summary of the work carried out by Harald SEIDELIN on his recent expedition to Yucatan on the subject of yellow fever (see this *Bulletin* Vol. 1, p. 246).

C. M. W.

JACOBI (Carlos). **Un Nuevo Método Profiláctico de la Fiebre Amarilla.** [A New Method of Prophylaxis for Yellow Fever.]—*Annales de la Acad. de Ciencias de la Habana.* 1912. Oct. Vol. 49. pp. 371-384.

This is a reprint of a paper read in 1864. The author points out that yellow fever is generally a benign disease in the months of January and February and is more serious from June to September. Accordingly he suggests that if it can be shown that yellow fever is transmissible by inoculation it might be advisable to inoculate people from benign cases in order to protect them from the possibility of acquiring the more serious type of disease.

C. M. W.

NOC (F.). **Le Diagnostic Biologique des Fièvres Amariles et des Rémittentes Bilieuses d'Origine Paludéenne.** [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1912. Oct.-Nov.-Dec. Vol. 15. No. 4. pp. 875-879.

Now that yellow fever has been checked by the systematic destruction of Stegomyia larvae it often becomes a matter of extreme difficulty to arrive at a diagnosis between bilious remittent fever of malarial origin and the bilious fevers of a mild form (*inflammatoires des Antilles*) which are really yellow fever. This is especially the case in the Antilles and Guiana. The necessity of recognising these mild cases of yellow fever is obvious, for it is such cases which cause the disease to survive through periods when the sanitary condition is excellent. To arrive at a diagnosis three points must receive special attention: (1) Repeated examinations of the blood; (2) Examination of the urine for albumin; and (3) A study of the leucocytic formula. The author mentions the case of a man who suffered from remittent fever, bilious vomiting, jaundice, icterus, and profuse sweating. There was absence of albumin in the urine, slight mononuclear increase, but no malarial parasites in the blood. The patient had taken quinine. Such a case, occurring in a district in which the mild form of yellow fever was endemic, offered great difficulties of diagnosis, which was eventually

arrived at by stopping the quinine and the finding of ring malarial parasites in the blood after a recurrence of the fever and bilious vomiting.

Notes of several cases of fever are given to show how the blood picture may vary in the mild forms of yellow fever. Two periods occur, one of polynuclear increase with diminution or total disappearance of the eosinophiles and another and later in which a general mononuclear increase takes place. The first period is before the remission, the second from the third to the sixth day. Attention to the three points mentioned above will ensure a correct diagnosis.

C. M. W.

PAPPATACI FEVER.

NICLOT. **A propos de la Fièvre à Pappataci.**—*Bull. Soc. Path. Exot.* 1912. Dec. Vol. 5. No. 10. pp. 780-781.

A survey of French investigations is made. MIORCEC and LAPLANCHE* confirmed BIRT's observations on the existence of this malady in Crete; more than half of the French detachment, which numbered 200 men, were attacked in July and August. NICLOT† stated that he had received many specimens of *P. papatasii* from the various military posts in the Oran Division of Algeria during the years 1904 to 1907. In the year 1908 FOLEY and YVERNAULT‡ reported that they had captured these flies at Beni-Ounif in south western Algeria, and SERGENT found them at Biskra. In France the localities where the phlebotomus has been taken, are according to ROUYER,§ Alpes-Maritimes, Basses and Hautes-Alpes, Isere, the valley of the Oisans, Mount Genèvre, and the district round Briançon. LEGER and SÉGUINAUD announced their capture in Corsica (see this *Bulletin*, Vol. 1, p. 238).

C. Birt.

i. FRANCA (Carlos). *Phlebotomus papatasii* **(Scopoli) et Fièvre à Pappataci au Portugal.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 123-124.

ii. DOS SANTOS (L. Pereira). **Contribuição para o Estudo da "Febre de Papatasii" em Portugal.**—*Medicina Contemporanea.* 1913. Vol. 31. No. 3. pp. 20-23.

i. *P. papatasii* appears at Collares on the coast north of Lisbon in the months August, September, and October. Pappataci fever occurs. The depression during convalescence is sometimes great.

ii. The author gives a short account of the symptoms of the fever and the mode of its transmission for the benefit of his fellow practitioners in Portugal.

C. B.

CASTRO (A.). **Sulla Febbre dei Tre Giorni a Milazzo.**—*Malaria e Malat. d. Paesi. Caldi.* 1913. Mar. Vol. 4. No. 2. pp. 68-73.

The author has observed epidemics of three-day fever every summer since 1909 among the troops stationed at Milazzo in the north of Sicily. Last year the outbreak began at the end of June and reached its maximum in July and August, when the admissions rose to 10-30 a day. The usual symptoms of sandfly

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* *Bull. Bi-mensuel Soc. de Méd. Milit. Française.* 1911. Feb. 2. Vol. 5 No. 3. pp. 128–132.

† *Ibid.*, 1911. Mar. 16. Vol. 5. No. 6. p. 193.

‡ *Arch. de Méd. et de Pharm. Milit.* 1908. May.

§ *Bull. Bi-mensuel Soc. de Méd. Milit. Française.* 1911. Mar. 16. Vol. 5 No. 6. pp. 194–195.

fever were noted—severe pains in the head, back, and limbs, discomfort in the epigastrium; pyrexia for three days generally, and considerable debility for four or five days afterwards.

C. B.

SARLO-BISOGNI (FT.). **Di un'Epidemia di "Febbre dei Tre Giorni" a Francica (Provincia di Catanzaro).**—*Malaria e Malat. d. Paesi Caldi.* 1913. Mar. Vol. 4. No. 2. pp. 82-84.

A three-day fever which resembled sandfly fever prevailed at Francica in the south of Italy during July and August 1912. During the incubation period of some of the attacks, malaise and a tendency to headache were noted. Convalescence was protracted in some instances to 15 days through lassitude and weakness. Pyramidon was useful in alleviating the symptoms; aspirin, Dover's powder, and salicylate of soda were also employed with benefit.

C. B.

ARAVANDINOS (Anast.). **Klinische Erwägungen über das Dreitagefieber und die Dengue in Griechenland.** [Clinical Observations on Three-day Fever and Dengue in Greece.] — *Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Feb. Vol. 17. No. 4. pp. 109-120.

In May 1911 the author reported the occurrence of pappataci fever in Athens. Phlebotomi are common in Greece, and though the inhabitants do not suffer to a great extent from sandfly fever, probably because they acquired immunity by being attacked in infancy, yet visitors from other countries usually contract the infection during their first summer of residence. Two English ladies were attacked with this fever in July, two months after their arrival at Athens. The typical symptoms were observed, including leucopenia and slow pulse; phlebotomi were captured in their rooms.

Dengue breaks out in epidemic form every few years at ports along the coast of Greece, when a large proportion of the population is affected. In the Piraeus outbreak, which began at the end of August 1910, the characteristic eruption accompanied with itching and succeeded by desquamation, was rarely wanting; arthritic pains were severe; and in a few instances nephritis, orchitis, and parotitis were sequelae. The distinction between a dengue and a pappataci fever epidemic is unmistakable.

C. B.

NAVY (HEALTH). **Statistical Report of the Health of the Navy for the Year 1911.**—1912. London: Published by H.M. Stationery Office. [Phlebotomus Fever, pp. 53 and 67.]

Under the heading "Pyrexia" in the "Remarks on the Returns of the Mediterranean Station," one hundred and forty-four cases are recorded. A marked resemblance is to be noted

between the cases returned under pyrexia and phlebotomus fever. They chiefly occurred during the hot weather, and almost all were of short duration. Most of them originated at Malta or Platea, but many arose at the ports of the Riviera. The attacks lasted three or four days and were accompanied with high fever at the onset, furred tongue, head- and backache.

In "Remarks of the returns of the China Station," thirty-two cases of pyrexia are recorded, which were mostly of a very mild type, and caused disablement for a few days only. In none was there any resemblance to "Yangtse River fever."

Twenty-two cases of "pyrexia" are included in the returns of the Atlantic Fleet which was in Mediterranean waters during the year. It is stated that some of these were sandfly fever.

Seventeen similar attacks occurred in the "Pandora" when she was at Zanzibar.

[It is to be hoped that this fever will be given its specific name in future Annual Reports. In the Report for 1909 it is stated that the majority of cases recorded under the heading "pyrexia" in the Mediterranean were probably phlebotomus fever. Again in the Report for 1910, there appears the remark that most of the 98 cases of pyrexia in the Mediterranean seem to have been phlebotomus fever. Eighteen similar febrile attacks were contracted off the Siamese coast, the Solomon Islands, and the Queensland coast. Moreover in this volume there is an excellent paper by Fleet-Surgeon Kilroy and Surgeon Adshead on Phlebotomus Fever in Crete. The former officer exposed himself for five nights to the attacks of sandflies on Suda Island where the fever is very prevalent, contracted the disease, and infected a healthy man with blood withdrawn from his veins at the end of the first day of his illness.]

C. B.

Taylor (E. C.) & Khan (Mohammed Hakimullah).—**The Diagnosis of Sand-Fly Fever and its Differentiation from Malaria.**—*Indian Med. Gaz.* 1912. Dec. Vol. 47. No. 12. pp. 475-476.

161 cases of sandfly fever were admitted to the Militia Hospital at Parachinar, an Indian frontier post, about 100 miles west of Peshawar, during the months June to September 1912. The flushed face, suffused conjunctivae, injected fauces, slow pulse, complaint of severe aches and pains, and absence of parasites in the blood were marked in the majority of patients. There was pyrexia for one day in 73, for two days in 55, for three days in 24, and for four days or more, in 9 of those who were attacked. 112 cases of malaria came under observation during the same period, in 78 per cent. of which parasites were found. They were distinguished clinically from the phlebotomus infection, by the patients' complaint of "fever," and not of pains, by the absence of congestion of the eyes and fauces after the hot stage had passed, and by the pulse rate being over a hundred on admission.

C. B.

Phlebotomus and its Bionomics.

Marett (P. J.). **The Phlebotomus Flies of the Maltese Islands.**—*Jl. R. Army Med. Corps.* 1913. Feb. Vol. 20. No. 2. pp. 162-171.

Of 106 phlebotomi caught and encaged during the month of September 1911, 38 per cent. were male, and 30 per cent. female, *P. perniciosus*; 22 per cent. were male, and 13 per cent. were female, *P. minutus*. 12 per cent. of these flies died during the first twenty-four hours of captivity; more than half were dead at the end of three days; only two survived ten days in the cage; and this was their limit of life in captivity, the average duration of which was four days. *P. papatasii* were fewer in numbers than the above named. *P. nigerrimus* was scarce. The Maltese *P. papatasii* differs from the Dalmatian variety in the third segment of the antennae of the latter being only one-third longer than the fourth segment; and in the terminal segment of the superior clasper of the male being longer than the inferior clasper. The Austrian variety, however, is found also in Gozo. *P. papatasii* breeds in caves and embankments, *P. perniciosus* and *minutus* in rubble walls and bastions.

A larger number of pupae and larvae were found in the year 1911 than in the previous summer, when the rubble walls of Malta were investigated. In 1911 a cave in the island of Gozo was a special object of study: on more than one occasion two pupae were found on one stone. In hot weather the eggs hatch in six to nine days; if the tubes containing them were somewhat dry, this was delayed until twenty days. The larval stage lasts about eight weeks in summer, but under the influence of cold and moisture the larvae become torpid. As pupae they exist about 11 to 16 days; hence the interval which elapses between the date of the depositing of the ovum and the maturity of the insect is ten or eleven weeks. The average life of flies reared from pupae was eight days. Some quarters situated within 20 yards of a bastion wall which was believed to harbour sandflies, were infested with them, but a barrack-block forty or fifty yards away was free. Repairing and facing the rampart for about sixty yards in the neighbourhood of barracks which have been notorious for nearly a century, on account of the incidence of sandfly fever in the troops occupying them, have been the means of reducing the number of sandflies with which they were previously infested, and of preventing the fever. Vegetation does not appear to have any connection with the breeding places of phlebotomi, though trees and shrubs near a house may afford shelter for the mature fly.

C. B.

Newstead (R.). **Notes on Phlebotomus, with Descriptions of New Species. Part 1.**—*Bull. Entom. Research.* 1912. Dec. Vol. 3. No. 4. pp. 361-367.

In consequence of the slender differences which can be found among the group of Phlebotomi, great care must be exercised

in preserving specimens. Pinning so injures them that identification and microscopical examination are rendered impossible. The insects should be placed on a web-like layer of teased cotton wool contained in a strong shallow pill-box, but they must not be covered with wool, for such an addition breaks the appendages. The author finds that the third segment of the palpi is provided with a compound group of minute modified spines, which are spathuliform with a long and strongly curved pedicel in *P. papatasii*; squamiform with a short pedicel in *P. minutus*; spathuliform with short pedicels in *P. squamipleuris*. Hirsute glands are present on the two segments before the terminal portion of the antennae of all species except *P. antennatus*. They appear as depressions fringed with fine hairs.

P. minutus exists throughout the Mediterranean area, and in India. Three specimens were obtained from Suda Island, Crete. (In the year 1909 every soldier of the British detachment stationed on this island was attacked with sandfly fever.)

The author thinks that an African variety of this species occurs in the Soudan, British Central and West Africa, and in Rhodesia, differing in the relatively longer second and fourth segments of the palpi, and in the more pointed wings, though he admits that considerable variations in these characters are observed.

A single specimen of a new species named *P. antennatus* was secured from Salaga on the Gold Coast in 1911; the bead-like form of the third to the thirteenth antennal segments separate it from other species, and it possesses shorter and stouter legs than *P. minutus*.

A new species from Khartoum, named *P. squamipleuris*, is distinguished by the pleurae being clothed with large flat mosquito-like scales.

Specimens of *P. papatasii* have been received from Cairo, and Tokar, Red Sea Province.

C. B.

NEWSTEAD (R.). **Phlebotomus from West Africa.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 124-126.

A specimen was sent from Akjoucht, Mauritania which differed from *P. papatasii* in the inferior clasper being shorter and provided with four or more terminal spines, instead of two. It is probably identical with *P. duboscqui*.

A new species was obtained from Aguagon, Dahomey. The antennae indicate that it is a form intermediate between *P. papatasii* and *P. antennatus*. The third segment of the antenna is very short, and the end segment possesses hair-like scales.

C. B.

ROUBAUD (E.). **Quelques Mots sur les Phlébotomes de l'Afrique Occidentale Française.**—*Bull. Soc. Path. Exot.* 1913. Feb. Vol. 6. No. 2. pp. 126-128.

P. duboscqui is first seen at Akjoucht, Mauritania, in May at the beginning of the hot weather. It is also present in great

numbers at Boutilimit and Hombori. *P. papatasii* is abundant in the district of Timbuctoo, and is most numerous in newly built houses, in the clay walls of which it probably breeds. The natives are immune apparently, as no sandfly fever has been reported in that locality.

At Bingerville a lizard, *Agama colonorum*, asleep on a wall, was covered with *P. minutus*; the females were engorged with blood.

On the whole, phlebotomi do not appear to have a very extended range in West Africa, but it is possible they escape observation through feeding on animal hosts rather than on man.

C. B.

LUTZ (A.) & NEIVA (A.). **Contribuição para o Conhecimenco das Especies do Genero Phlebotomus existentes no Brazil.—Zur Kenntnis der brasilianischen Phlebotomusarten.**—*Memorias do Instituto Oswaldo Cruz.* 1912. Vol. 4. No. 1. pp. 84-95.

Few specimens of phlebotomi have been captured in the towns of Rio, Bahia, and San Paulo. They are found in larger numbers in the woods of Rio Trombeta (Para), in the valley of the Maquine and on the banks of the Tiete.

They are known in the last district under the name "birigui." They are most abundant at heights 500-1,500 metres above sea-level, where they also occur.

The Brazilian phlebotomi are not identical with those from other parts of the world. The authors describe the following new species.—

Phlebotomus squamiventris, so named since the dorsal surface of the abdomen is covered with scales. The order of the segments of the palp beginning with the shortest is 4, 5, 3, 2. Its habitats are along the Rio Trombeta where it is known as "tatuquira"; and in Para.

P. longipalpis is characterised by the great length of the last segment of the palps, the index of which is 4, 2, 3, 5. It is found in the States of St. Paul and Minas.

P. intermedius, palp index 5, 4, 3, 2, occurs in the States of Rio de Janeiro, Minas, and St. Paul.

None of these species resemble *P. vexator* (Coquillet) of the United States, nor *P. rostrans* (Summers) from Rio Javary.

C. B.

SUMMERS (Sophia L. M.). **A Synopsis of the Genus Phlebotomus.**—*Jl. London School Trop. Med.* 1913. Apr. Vol. 2. No. 2. pp. 104-116. With 2 text-figures.

Phlebotomus is represented by some species in most parts of the tropical and sub-tropical world.

P. papatasii occurs in Europe, Asia, and Africa.

P. mascitti resembles *P. papatasii* except in the form of the spines of the upper clasper.

P. minutus is distinguished by the second segment of the palps being half the length of the third; by the position of the forks of the second longitudinal vein of the wing; and by the possession of four spines on the end segment of the upper clasper of the male. It is found in Europe, Asia, and Africa.

P. nigerrimus. NEWSTEAD separates this from *P. papatasii* by its colour, shape of wing and shorter 6th longitudinal vein.

P. major, described by ANNANDALE, and named by NEWSTEAD *P. perniciosus,* has shorter legs, and a smaller genital armature than *P. papatasii.* It is the common sandfly of Malta. It is also found in Asia.

P. argentipes is provided with black bristly hairs on its abdomen; its legs are very long; the distal joint of the upper appendages in the male is shorter than the proximal. It is an Indian species.

P. himalayensis is yellowish grey; the anterior branch of the second longitudinal vein is not much shorter than the second branch, and is four times as long as the distance between the forks. The superior appendages of the male bear three pointed chaetae.

P. malabaricus is provided with four chaetae on the upper male appendage.

P. vexator is a yellow species with brown mesonotum and hairs; the first submarginal cell is rather more than twice as long as its petiole; the arrangement of the five spines on the upper clasper of the male differs somewhat from that of *P. papatasii.* It is found in Plummers Island, Maryland.

P. cruciatus is distinguished from *P. vexator* by its yellow hairs and first submarginal cell, which is three times as long as its petiole. It occurs in Guatemala.

P. rostrans is remarkable for the great length of its head. It has been captured on the Rio Javary, S. America.

P. babu was described by ANNANDALE who now identifies it with *P. minutus.*

P. zeylanicus closely resembles *P. argentipes.*

Other species are given in the preceding abstracts.

C. B.

DENGUE.

STITT (E. R.). **Dengue, its History, Symptomatology, and Epidemiology.**—*Bull. Johns Hopkins Hosp.* 1913. April. Vol. 24. No. 266. pp. 117-121. [Discussion pp. 124-125.]

The author traces the history of dengue back to 1779, when GABERTE described an epidemic in Cairo. In 1780 a disease called "breakbone fever" was epidemic in Philadelphia; this was described very fully by RUSH who, though giving a clear picture of dengue, possibly included some cases of typhoid, yellow fever, malaria, and dysentery. In an outline of the symptoms of dengue, the author lays great stress on the early leucopenia, and the slowing of the pulse, even as low as 45 per minute; these conclusions were founded upon observations of 100 cases treated in the Philippines. It would appear however that this marked slowing of the pulse is less evident in America than in the Philippines, for GOLDBERGER stated in the discussion following the paper that it was not a marked feature in his experience, and though slower than in cases of influenza etc. the pulse was less slow than in cases of yellow fever. The mosquito experiments of ASHBURN and CRAIG are criticised. As strong evidence of the truth of the mosquito theory, the disappearance of dengue from Port Said in 1906-1907 during E. H. ROSS's anti-mosquito campaign is brought forward. Also, when the author was in charge of a hospital in the Philippines, where 200 cases of dengue were treated in screened cubicles in a general ward, no infection of other cases in the ward took place.

P. W. Bassett-Smith.

CANAAN (T.). **Beobachtungen bei einer Denguefieber-Epidemie in Jerusalem.** [Observations on an Epidemic of Dengue in Jerusalem.]—*Arch. f. Schiffs- & Trop.-Hyg.* 1913. Jan. Vol. 17. No. 1. pp. 20-25.

During the hot sirocco days of October 1912 this disease was very common in Jerusalem, spreading from the central parts of the city to the outskirts, affecting in the households almost all the members except children under two-and-a-half years. A full description of the clinical features is given; the most noticeable of these were, a short irregular fever, severe pains and great mental depression with or without delirium, marked gastro-intestinal symptoms, tendency to haemorrhages, and a scarlatiniform rash. The blood examinations always showed a pronounced leucopenia with a relative increase in the mononuclear cells; the parasites described by GRAHAM were never found. *Culex pipiens* are present in large numbers in Jerusalem.

The author states that this dengue epidemic in its symptoms resembled very closely pappataci fever (*Phlebotomus papatasii* is also very common in the town), but differed in the following points. Pappataci fever generally infects new comers, dengue the older inhabitants; in the former the fever lasts 3-5 days, in dengue 6-8 days, except in very slight cases. In the described epidemic the eruption was present in most of the cases, whereas in pappataci fever the eruption is present in only 30 per cent. of cases.

P. W. B.-S.

HOSSACK (W. L.). **The Problem of Dengue, Three-day and Seven-day Fever.**—*Indian Med. Gaz.* 1913. Feb. Vol. 48. No. 2. pp. 49-52.

The author gives a review of the work of ROGERS, MACCARRISON, FOOKS, ASHBURN and CRAIG, MEGAW, CHARLES, and KENNEDY relating to three day fever, seven day fever, and dengue in India and the Philippines. He describes the course of the epidemic in 1912 in the Calcutta district, with special reference to its occurrence on board ships, notably the "Lady Fraser." Details of a few cases which came under his own observation on shore are given in which the symptoms were severe and the pains intense, like those described in text books as associated with true dengue. He comes to the following conclusions:—

(1) That the epidemic at Calcutta in 1912 was similar to that described as dengue in previous years.

(2) That the 1912 epidemic comprised cases clinically distinguishable from three day fever but indistinguishable from seven day fever.

(3) That the evidence is against phlebotomous being the infecting agent, and that in the later stages of the "Lady Fraser" epidemic, insect infection was almost precluded altogether.

(4) That the recent epidemic at Calcutta seems to be an expression of a variable disease, caused by an ultra-microscopical organism which is endemically present in Calcutta, and gives rise to diseases known as three day fever and seven day fever.

P. W. B.-S.

SMITH (F.). **Dengue Fever among the Troops in Calcutta; its Identity with Seven-day Fever and Three-day Fever.**—*Jl. R. Army Med. Corps.* 1913. April. Vol. 20. No. 4. pp. 453-458. With 12 temperature charts.

The author lays great emphasis on the increase of mild local fevers in Calcutta from year to year. The common types found were previously called three day fever and seven day fever; these had all the clinical characters of the cases in the more extensive epidemic of 1912 observed by the author, who is sure that the disease is true dengue, and that therefore three day fever, seven day fever, and dengue, are here the same disease. The fever always comes on in the hot weather and ceases about October. Among the troops there were 113 cases in 1910, 124 in 1911, and 461 in 1912.

The author states that sandfly fever is common in the North West Provinces, and that troops when removed from that district to Calcutta had no immunity from the local dengue fever of Calcutta, which should have been observed if these fevers were due to the same cause; also that sandflies are not common in Calcutta, but very common in the North West Provinces. A series of cases and 12 charts are given, several of the latter giving a typical saddle-back type.

P. W. B.-S.

HARNETT (W. L.). **The Differential Blood Count in Dengue.**—*Indian Med. Gaz.* 1913. Feb. Vol. 48. No. 2. pp. 45-59. With 18 charts.

The author describes an epidemic of dengue fever which occurred in the lower Brahmaputra district from May to September 1912. Clinically the fever showed variations from the three day type to the saddle back and irregular continued type. Headache and pains in the loins were generally present, and rash was frequent, being most easily seen in Europeans. Specially attention was paid to the changes in the blood; besides the usual leucopenia, diminution in the polynuclear leucocytes, and a relative increase in the mononuclear lymphocytes, a marked eosinophilia was recorded, giving an average of 13·8 per cent. in the 24 cases; the details of each are given. The estimation was made from a count of 200 leucocytes in most cases. Most of the patients were Asiatics, but the author states that in several examinations for intestinal ova negative results were obtained, and these same characters were found in a number of blood examinations which were made on patients suffering from "three day" fever at Dehra Dun. The author considers that leucopenia with a rapidly developing eosinophilia is a characteristic blood change found towards the end of the first week of an attack of dengue, and that this peculiarity may help to settle the question whether "three-day fever" "seven-day fever" and dengue are one and the same disease. Further observations are however required.

[The number of leucocytes counted is small to dogmatise on, and other causes of eosinophilia are hardly sufficiently excluded.]

P. W. B.-S.

SLEEPING SICKNESS.

Transmission.

Kleine (F. K.) & Eckard (B.). **Ueber die Bedeutung der Speicheldrüseninfektion bei der Schlafkrankheitsfliege** (*Glossina palpalis*). [The Significance of Infection of the Salivary Glands in Sleeping Sickness Tsetse Flies.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1913. Apr. Vol. 74. No. 1. pp. 183-186.

The object of the experiments described in this paper was to ascertain whether the trypanosomes found in the salivary glands and in the alimentary canal of *G. palpalis*, proved to be capable of infecting animals with *T. gambiense*, were virulent when injected into susceptible animals. If only those animals into which the gut contents were injected became infected, then it would appear that the salivary gland invasion was only an incidental occurrence and not essential. This would also be the case if both sets of animals became infected. If however infection only occurred in those animals which had received the salivary gland contents, some special significance must be attributed to these organs; the completion of the development of the trypanosome must take place only in the salivary glands.

Experiments.—Six infective *Glossina palpalis*, 45-62 days old, were killed and the contents of the salivary glands and intestine injected separately into different monkeys; in the case of three of these the contents of the proventriculus were also injected into healthy monkeys. Only those animals became infected which had received the contents of the salivary glands; those which had been injected with the trypanosomes from the gut or proventriculus remained unaffected.

It follows that infective parasites are only found in the salivary glands and that before development is complete the trypanosomes invade these structures. So long as it was believed that salivary gland infection occurred only occasionally it was assumed that the trypanosomes reached the glands via the proventriculus, oesophagus and hypopharynx; since however it appears to be the rule, this route of invasion seems unlikely and we must consider the direct path through the coelom. Experiments to determine the point are in progress. [These results are at variance with those of the Royal Society Commission in Uganda, and of Kinghorn and Yorke in Northern Rhodesia; both these sets of observers found that the intestinal parasites of infective flies were virulent as well as the salivary gland contents.]

W. Yorke.

Wenyon (C. M.). **Experiments on the Transmission of *Trypanosoma lewisi* by means of Fleas.**—*Jl. London School Trop. Med.* 1913. Apr. Vol. 2. No. 2. pp. 119-123.

The author refers to a previous paper (this *Bulletin*, No. 7, p. 366) in which he reported he had been able to confirm Nöller's work (*Sleeping Sickness Bulletin*, Vol. 4, p. 215) on the transmission of *T. lewisi* by means of the dog flea *Ctenocephalus canis*. An infected flea, fixed on wire as recommended

by Nöller, was fed upon a clean rat and the faeces passed during the feed were caught on a coverslip and transferred by means of a fine pipette to a tube of N.N.N. medium. The diluted fluid was then introduced into the mouth of another clean rat, care being taken to avoid injuring the skin. The experiment was repeated three times with the dog flea and in each instance it was the rat which received the faeces that became infected and not the rat on which the flea had fed.

This experiment was repeated with the human flea, *Pulex irritans.* An attempt was also made to transmit *T. lewisi* by means of *Pulex irritans* when free. On three occasions fleas, proved to be infected by examination of the faeces, were liberated from the wire and placed on clean rats. In each instance the flea disappeared and the rat did not become infected. It was subsequently found that *Pulex irritans* when placed on a rat exhibits great uneasiness, jumping on and off the animal, giving the impression that it does not feel at home. Its behaviour was in marked contrast to that of the true rat fleas *Ceratophyllus fasciatus* and *Xenopsylla chœopis,* which immediately hide themselves in the fur.

Experiments conducted with *Xenopsylla chœopis,* the common rat-flea of India, demonstrate that this flea is a true host of *T. lewisi.* The results obtained with *Xenopsylla* indicate that probably the faecal mode of infection obtains as in the case of the dog and human fleas.

The author refers to the experiments of Minchin and Thomson with *T. lewisi* and *Ceratophyllus fasciatus,* which suggest that infection results from the regurgitation of the small trypanosomes which have wandered forward from the rectum to the mid-gut; he points out that this cannot be the regular mode of infection in *Ctenocephalus* and *Pulex.* The passage forwards of the small trypanosomes from the flea's rectum to the mid-gut is in the author's opinion fortuitous, dependent upon the violent peristaltic contractions of the gut of the flea whilst feeding. It is urged that the fact that the final development of the infective forms of *T. lewisi* occurs in the rectum strongly supports the faecal method of infection. In *Glossina* and leeches, which are known to transmit trypanosomes by their bite, the final development of the parasites is in the anterior part of the gut or in its appendages (proboscis or salivary glands).

The favourite haunt of *Xenopsylla* is the posterior part of the rat's back, just above the root of the tail. Here the faeces are deposited and the rat licks up the dry faeces and occasionally the moist faeces just deposited. When a flea is quite undisturbed while feeding it will often become distended to an enormous extent; in this condition a slight movement will cause it to eject at once a comparatively large drop of faeces and the rat has thus every chance of taking up freshly passed moist faeces. It is suggested that, as *T. lewisi* can complete its development in so many different invertebrate hosts, other trypanosomes may follow in this respect. In conclusion the author remarks that it cannot any longer be held that a difference in invertebrate host necessarily means a difference in species of trypanosomes.

W. Y.

Clinical.

Lagane (L.). **Pouls lent dans la Trypanosomiase humaine.**—*Bull. Soc. Path. Exot.* 1913. Apr. Vol. 6. No. 4. pp. 269-272.

An account is given of two cases of human trypanosomiasis from the Congo in which bradycardia was a pronounced symptom. The pulse frequency was in the first case 50-58 per minute and in the second 50-62. With the exception of bradycardia auscultation of the heart revealed nothing abnormal. Administration of atropine or nitrite of amyl accelerated the pulse. The inference is drawn that the condition is not due to auriculo-ventricular inco-ordination, but that it is a true nervous bradycardia. It is suggested that possibly the phenomenon may result from slight irritation of the vagus, as it passes through the sub-arachnoid space. The symptom is unfavourable from the point of view of prognosis, whilst its disappearance under the influence of treatment is to be regarded as a sign of amelioration.

W. Y.

Heckenroth (F.). **Réactions locales de début dans un nouveau Cas de Trypanosomiase humaine chez l'Européen.**—*Bull. Soc. Path. Exot.* 1913. Apr. Vol. 6. No. 4. pp. 267-269.

Reference is made to a case of trypanosomiasis in which the first symptom was a painful swelling on the scalp. The following day a similar swelling was observed on the inner surface of the left knee. The author states that he has no doubt that these resulted from the bites of an insect, most probably the tsetse as this fly is abundant at M'Pokou (Congo) where the patient was stationed. The diagnosis of the disease was made subsequently by examination of the juice from one of the enlarged cervical glands. He concludes by stating that such local reactions should make Europeans suspect trypanosomiasis and induce them to present themselves for medical examination with as little delay as possible. [Such furuncle-like swellings have frequently been attributed to infective bites. This case is of interest in so far as there were simultaneously two lesions situated on such widely separated portions of the body as the scalp and the knee.]*

W. Y.

Newham (H. B.). **Trypanosomiasis. London School of Tropical Medicine. 3rd Report.**—*Jl. London School Trop. Med.* 1913. Apr. Vol. 2. No. 2. pp. 144-146.

This paper gives the clinical and pathological record of a case (No. 16, W.G.) of trypanosomiasis contracted in Rhodesia. (See *Sleeping Sickness Bulletin.* Vol. 4. p. 19.) During the last six weeks of life cerebral symptoms were pronounced.

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* Those interested in this symptom should refer to *Sleeping Sickness Bulletin* Vol. 3, pp. 5–7, where the cases then recorded as showing it were collected and discussed. One patient had no less than five, two others two of these swellings. The symptom seems to be less usual in natives than in Europeans. A.G.B.

Microscopical examination of the cerebrum revealed well-marked perivascular infiltration with round cells; a similar but less extensive infiltration was noted in the grey matter of the spinal cord. The author remarks that this is the third case of Rhodesian trypanosomiasis which has been under observation at the London School of Tropical Medicine. The other two died five months after infection, without the development of cerebral symptoms. This patient lived three years and three months. In spite of the fact that treatment had been commenced within a month of the onset of symptoms the disease had never been more than under control. The contrast between these three cases and those from other parts of Africa indicates the greater malignancy of the Rhodesian infection.

W. Y.

Treatment.

Aubert (P.) & Heckenroth (F.). **L'Arsenophénylglycine dans la Prophylaxie chimique de la Trypanosomiase humaine.**—*Bull. Soc. Path. Exot.* 1913. Apr. Vol. 6. No. 4. pp. 272-276.

Reference is made to a previous paper (*Sleeping Sickness Bulletin*, Vol. 3, p. 259) in which, on account of the intense local inflammation which frequently followed subcutaneous injection of arsenophenylglycin, the authors recommended intravenous injection of the drug. This paper records the results of treatment of a large number (88) of cases of sleeping sickness by intravenous injection of this substance. Certain recommendations regarding the general technique are made. Owing to the rapidity with which arsenophenylglycin decomposes in air one should always make certain that there is a vacuum in the ampoules in which the drug is supplied. The drug was dissolved in water containing ·6 to ·9 per cent. of sea salt or merely in distilled water. The freshly made filtered solution should be used. One or two injections were given. The dose recommended is 45 milligrammes per kilo of the body weight of the patient. The two injections should be given at intervals of four or five days. Larger doses should be avoided, as in certain cases they may produce toxic effects. The degree of concentration of the solution is important. The volume of fluid injected should not be less than 100-120 cc. If more concentrated solutions are used reactions are more common.

In a table the results are given of treating by this method 37 cases in which it had been possible to make frequent examination of the centrifuged blood subsequently. Twenty were improved by the treatment, twelve remained unaffected, and in five the symptoms were aggravated. Four of the patients died. The duration of sterilisation in 25 was at least 6 months, and five were in a state of perfect health 25, 24, 22, 18 and 15 months respectively after treatment and can, therefore, be considered to be definitely cured.

The conclusions are:—

Arsenophenylglycin is a remedy which possesses an energetic and prolonged power of sterilisation.

Intravenous injection is the best method of administering the drug.

Injections given in the doses mentioned are tolerated well by the patients.

On account of the promptness of its action, the prolonged sterilisation, and marked amelioration of the general condition which it causes, intravenous injection of arsenophenylglycin is a valuable method of treatment and one which it is to be hoped will be generally used in the treatment of human trypanosomiasis.

W. Y.

YOUNG (J. C.). **A Case of Trypanosomiasis treated by Intravenous Injections of Tartar Emetic.**—*Univ. of Durham College of Med. Gaz.* 1912. Nov. 15. Vol. 13. No. 2. pp. 19-25.

The author, as ship's surgeon, had charge of a European suffering from trypanosomiasis between Chinde and Marseilles. This was the elephant hunter whose case was originally described in *Sleeping Sickness Bulletin,* Vol. 4, p. 266. Further accounts of the case have been given in this *Bulletin,* Vol. 1, pp. 275 and 514. On the patient's embarkation the chief points noted were the extreme pallor of the face, emaciation, and oedema of feet and legs. Treatment was by intravenous injections of tartar emetic which appeared to give rise on several occasions to oedema of the middle third of the upper lip and to extreme distention of the abdomen. Six injections were given at intervals of five days and were followed by marked improvement. The temperature chart is given. When the ship was in the Red Sea it was noticed that the axillary and femoral glands became enlarged and slightly tender.

A. G. B.

TRYPANOSOMIASIS IN RHODESIA.

STOHR (F. O.). **Report on Sebungwe Fly Area.** MS. Report to British South Africa Company. Dated Jan. 1913.

After giving an account of the physical characters of the Sebungwe fly belt (Southern Rhodesia), the author states that he has found it impossible to correlate the boundary of the fly area with any physical feature. Game is numerous and as a general rule the fly is thickest where the game is most abundant, but at Bwampu where the fly is very plentiful there seems to be no game in the dry season.

The area, which is roughly 2,500 sq. miles, is sparsely populated, there being only about 3,000 natives; with the exception of a few Government officials there are no white people.

History.—It is generally agreed among the old chiefs that before the rinderpest fly was more numerous than at the present time, and all informants connected its disappearance with the extermination of the buffalo. Soon after the reappearance of the tsetse domestic stock began to die.

In all 2,340 persons were examined and 11 cases of Sleeping Sickness were found. The diagnosis in nine of these was made by gland puncture (the glands of 87 persons were punctured) and in the other two by examination of the blood (170 blood examinations were made); the first of these two cases was an infant with little shotty glands and the second was one of the author's carriers in whom trypanosomes were found on the first day of sickness

The clinical features of the disease are compared with those of cases seen by the author in Katanga. It is noted that this form is of much greater severity than that of the Katanga. Of the 11 cases found one had a history of 2½ years' illness, whilst that of the others was less than 6 months. The inference is drawn that the disease rarely lasts more than a year. Nine of the patients were obviously ill when the diagnosis was made. Five had the distinctive chain of glands, whilst other five had only one or two enlarged glands. In every case trypanosomes were easily found at the first puncture.

Trypanosomiasis of domestic animals.—Trypanosomes were found in 2 of 51 goats, 6 of 24 sheep, and in 12 of 20 dogs. Only animals in obviously poor condition were examined.

Trypanosomiasis in game.—Blood was examined from the following wild animals shot in the fly area—duiker (1), elephant (1), roan (1), zebra (4), eland (4), mpala (2), warthog (2), and waterbuck (5). Trypanosomes were found in two waterbuck. [A description of the trypanosomes is given—the author assumes that the parasites infecting man, small stock and dogs are the same—but as the examination was limited to fresh preparations no conclusion can be drawn as to the identity of the trypanosome or trypanosomes found. An account of the parasites obtained from one of the human cases, from an infected dog and goat, and from waterbuck is given below by Bevan.]

Discussing the question of prophylaxis the author writes that he considers that if the population be removed from the area, the fly and game are likely to increase and spread until the invasion of surrounding villages demands further removals. He is of the opinion that some measure should be undertaken to deal with the fly or the game, which was shown by Kinghorn and Yorke in N. Rhodesia to be the reservoir of the virus. As we have no knowledge how satisfactorily to attack the fly, he advocates the shooting of the wild animals in the fly area.

W. Y.

Bevan (Ll. E. W.). **Preliminary Notes on a Trypanosome causing Disease in Man and Animals in the Sebungwe District of Southern Rhodesia.**—*Jl. Trop. Med. & Hyg.* 1913. Apr. 15. Vol. 16. No. 8. pp. 113-117. With temperature charts and 2 plates.

The strains used in these observations were obtained from natives and animals suffering from trypanosomiasis in the vicinity of the Busi river in the Sebungwe District of Southern Rhodesia (see above). The blood from the natural cases was inoculated into clean rabbits which were returned without delay to the Veterinary Laboratory at Salisbury. Two rabbits were inoculated from man, two from a dog, and two from a goat. A table of observations made on these six rabbits is given in some detail. Four of them died in from twelve to twenty-seven days, and two, infected from the dog and goat respectively, had a chronic infection. Another table gives the duration of the disease in animals subinoculated from the rabbits. The movements of

the trypanosomes of the three strains were similar; there was no active translation. The fixed and stained trypanosomes of each strain appeared identical. There were tadpole forms of 'pecorum' type, stumpy, intermediate, and long free-flagellated forms of 'nagana' type, the types merging into one another. A number of individuals of each of the strains showed numerous large metachromatic granules, both in the anterior and posterior halves of the body in all forms of the parasite. In each strain forms were met with having the nucleus situated in the posterior third. Measurements of the trypanosomes of each strain are given. It is seen that the Sebungwe trypanosome in the rabbit shows shorter minimum and maximum forms than allied species, but that the average corresponds very closely with KINGHORN and YORKE's estimate of *T. rhodesiense.*

The symptoms seen in rabbits, dogs and sheep are given. The rabbits did not show oedema of the head characteristic of the infection produced by the W. A. strain of Luangwa trypanosome. There was some oedema of the face in sheep, but it did not increase to the same extent as did that of sheep inoculated with the Luangwa trypanosome. The temperature charts of these animals are given. Blood smears taken from wild animals shot in the Sebungwe fly area were stained and examined at the laboratory. Trypanosomes were met with in smears from three waterbuck. No distinction could be drawn between these trypanosomes and those met with in the infected natives and domestic animals.

The plates show trypanosomes seen in a blood smear taken from a naturally infected dog, and sheep infected one with the original 'W.A.' strain and the other with the Sebungwe strain of *T. rhodesiense.*

A. G .B.

WENYON (C. M.) & HANSCHELL (H. M.). **A Further Note on *Trypanosoma rhodesiense* from Three Cases of Human Trypanosomiasis.***—*Jl. London School Trop. Med.* 1913. Apr. Vol. 2. No. 2. pp. 123-128.

This paper records observations on the incidence of posterior nuclear forms in the blood of man and rats infected with *T. rhodesiense.* No such forms were found in the blood of any of the three human beings (G, E, T) examined, although in one of the cases the trypanosomes occurred in the blood in rather large numbers. They were found, however, in the blood of the first rat inoculated from the human cases. Observations were made with the object of determining in the subinoculated rats the constancy of the appearance of the posterior nuclear forms, their percentage number and the extent of variation of this number, and their relation to the virulence of the strain. Although the nuclear displacement occurred most frequently in the broad trypanosomes, it was also observed in the narrowest forms with long free flagellum.

* For a summary of the previous note see this *Bulletin*, Vol. 1, p. 276.

On certain days of the infection in rats posterior-nuclear forms were absent: this applies to each of the three strains. In the fifth passage of one of the strains (E), during the twelve days the rat lived no posterior nuclear forms were found. In all the strains, and in some particular passages, the percentage of these forms varied greatly. The authors have the impression that posterior nuclear forms are more numerous in the first passage in the rat, and that they tend to become scantier with each subsequent passage.

No correlation was found to exist between the number of posterior nuclear forms and the virulence of the strain for white rats.

Details of the percentage of posterior nuclear forms encountered on various days of the infection in the different passages in white rats in each of the strains are given in tables.

W. Y.

VON PROWAZEK (S.). **Ueber reine Trypanosomenstämme.** [On Pure Strains of Trypanosomes.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Apr. 16. Vol. 68. No. 5-6. pp. 498-501.

The author refers to the work of OEHLER (see this *Bulletin*, Vol. 1, p. 525). Similar experiments have been carried out at the Institut für Schiffs- und Tropenkrankheiten at Hamburg. The strains used were one of *T. rhodesiense*, one of *T. equinum* which was naturally atoxyl-fast,* and the Proteosoma of the canary. The object was to see (1) Whether infection could be obtained with a single trypanosome; (2) Whether dimorphism, which is specially marked in *T. rhodesiense*, is primary, or whether the various forms can arise from a single individual; (3) To ascertain whether various peculiarities of a strain, such as atoxyl-fastness and absence of blepharoplast, are contained primarily in the strain or appear owing to selection or are mutation products; (4) To obtain by pure infection material for chemotherapeutic experiments; (5) To make curves of pure and non-pure strains after BRUCE's method; (6) To answer for bird malaria the question whether one can infect with ripe macrogametes and thus indirectly to show that relapses are referable to parthenogenesis. It is noted that these last experiments were negative.

(1) The author succeeded, as OEHLER did, in obtaining infection with a single trypanosome. (2) In the *rhodesiense* strain there appeared in the third, and certainly in the fourth passage broad forms as well as slim forms. Forms without nuclei were also seen at the fourth passage. The dimorphism of this trypanosome is accordingly not primary. (3) The experiments showed that the pure strain of mal de caderas behaved differently towards atoxyl and salvarsan to the original strain; in the former the trypanosomes disappeared for a time and death was delayed. (4) At the first divisions of the strain obtained from a single individual variations as regards the division products are seen. The trypanosomes do not take on vital staining

* For an account of this strain see this *Bulletin*, Vol. 1, p. 56.

simultaneously or equally quickly, nor do they all die at the same time. Differences are also observed in the method of division. Thus, early in the life of the pure strain, primary differences in metabolism, as well as differences in division, were obtained.

The naturally atoxyl-fast strain of mal de caderas at the time of these experiments had gone through 714 passages without passing through the body of an insect and had undergone no change. The experiments are still in progress.

A. G. B.

DOBELL (Clifford). **Some Recent Work on Mutation in Micro-organisms.**—*Jl. of Genetics.* 1912. Nov. 21. Vol. 2. No. 3. pp. 201-220.

The author uses the term mutation to denote those heritable modifications which have been induced in various ways in various micro-organisms. He begins with observations on mutations in trypanosomes, which, he writes, are considered in a somewhat critical spirit. They are classed as morphological and physiological. Under the heading Morphological Mutations the work of WENDELSTADT and FELLMER is first considered (see *Sleeping Sickness Bulletin*, Vol. 1, p. 388 and Vol. 2, p. 174). These authors found that *T. brucei* and *T. lewisi* may be inoculated into cold-blooded vertebrates and invertebrates, in which they live for a certain time and undergo morphological changes.* He goes on to consider the morphological mutation discovered by WERBITSKI and confirmed by other workers (see *Sleeping Sickness Bulletin*, Vol. 2, p. 98, Vol. 3, pp. 221, 313, 314, 458, and Vol. 4, p. 33).

Under the heading Physiological Mutations the phenomenon of chemo-resistance is considered and some space is given to the work of GONDER on the loss of arsenic resistance of *T. lewisi* in the course of development in the louse (see *Sleeping Sickness Bulletin*, Vol. 4, p. 13). The more important results are summarised thus—

"(A) It has been stated that the passage of certain Trypanosomes, which normally occur in mammals, through cold-blooded vertebrates and certain invertebrates, causes them to undergo certain structural changes which persist during subsequent divisions (Wendelstadt and Fellmer). This work has not yet been confirmed.

"It has further been stated (Werbitzki) and confirmed (Laveran and Roudsky, Kudicke) that certain dyes can destroy a definite organ (kinetonucleus) in a Trypanosome, without killing or injuring it or impairing its power of propagation. Thus new races of Trypanosomes may be produced which completely lack this organ. It has, moreover, been rendered highly probable that the dyes which have this power possess a certain chemical structure (orthoquinoid substances of Ehrlich): and that the dyes have a specific action upon the kinetonucleus—but upon no other organ in the Trypanosome—and bring about its destruction by autoxidation (Laveran and Roudsky). New races of Trypanosomes are thus produced by modifying the individuals of the old—not by selection.

"(B) Races of Trypanosomes without kinetonuclei possess a lowered virulence (Werbitzki, Laveran and Roudsky).

"By the action of various drugs and antibodies, races of Trypanosomes may be obtained which are resistant to these substances (Ehrlich, Mesnil

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* In the second of the above references these trypanosomes are said to have been inoculated into adders; this should have been grass snakes (*Tropidonotus natrix*), as Mr. Dobell has pointed out.

and Brimont, Breinl and Nierenstein, Levaditi and Twort, &c.). These races subsequently breed true—though it may be a necessary condition of this that they be kept in the same sort of host as that in which they originally acquired their resistance.

"Races of Trypanosomes with a changed virulence are said to be produced by passage through certain animals (Wendelstadt and Fellmer): but this has been denied (Gonder and Sieber, Laveran and Pettit).

"By treating *T. lewisi* with arsenophenylglycin, a race may be obtained which is resistant to this drug. This race breeds true—retaining its resistance during numerous passages through untreated rats. Resistant and non-resistant races remain unchanged, as regards this character, when grown in artificial cultures. When the resistant race undergoes a development in the louse—the exact nature of which is not determined, though it is possibly sexual—resistance is gradually lost, and the race returns to the original non-resistant condition (Gonder).

"It has not been definitely determined whether resistance is brought about by the direct action of the poison on the living Trypanosome (Ehrlich, &c.), or whether it is the result of selection (Levaditi, &c.)."

A. G. B.

Ogawa (M.). **Quelques Observations sur le Dimorphisme de** *Trypanosoma pecaudi.—Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 15. Vol. 68. No. 3-4. pp. 332-334. With 3 tables and 3 text-figures.

The author has made a short study of *Trypanosoma pecaudi*, the virus of Baleri, on biometric lines, having measured 1,200 trypanosomes from two guinea-pigs. 1,000 trypanosomes at the rate of 100 a day for 10 days were taken from one guinea-pig, the remainder from another. Two forms of parasites occur in *T. pecaudi*: (1) long drawn out forms, (2) short stumpy forms. The author states that during the course of infection a relation exists between the two forms. Long forms and dividing forms appear first in the blood, short forms not till some days after the long ones. When the disease is of somewhat long duration as in guinea-pigs, from the middle period short forms occur in large numbers, but long forms reappear and dominate during the last period. In animals which succumb quickly, the long forms are in much greater numbers than any other forms, throughout the infection.

Two tables, showing the percentage of trypanosomes of lengths varying by half a micron obtained by the use of the curvimeter of 1 mm. tooth interval ($= \frac{1}{2}\mu$ at a magnification of 2,000 diameters), are given, together with a graphical representation.

The dimensions of the trypanosomes are as follows: Long drawn out forms, 24μ to 34μ by 1μ to $1{\cdot}5\mu$. Short stumpy forms without free flagella 12μ to 20μ by $2{\cdot}5\mu$ to 4μ, Intermediate forms with short flagella 21μ to 23μ by $1{\cdot}5\mu$ to 2μ. A few forms with posterior nuclei were seen, of which 3 text figures are given.

H. B. Fantham.

Cazalbou (L.). **Observation d'un Nouveau Trypanosome chez le Lapin.**—*Receuil de Médecine Vétérinaire.* 1913. Mar. 15. Vol. 90. No. 5. pp. 155-158.

The author has recently studied a trypanosome occurring in the blood of young rabbits at Rennes. The parasite was obtained

from a victim of an epizootic. When three weeks old, the growth of the rabbits was interrupted. They rapidly became emaciated, paralysis of the hind-quarters occurred and death ensued some weeks after the appearance of the malady. Investigation of the glands was negative. From the blood of one dead rabbit, fifteen slides were prepared and examination of these revealed the presence of one solitary trypanosome. Sub-inoculation of a guinea-pig with blood from a rabbit dying from the epizootic has so far been negative. The proof of the pathogenicity of the trypanosome has not been established.

The trypanosome is about 80μ long, the free flagellum being 10μ to 12μ. The undulating membrane is broad and the maximum width to the flagellar border is 8μ. The oval nucleus is median. One text-figure is given.

The author gives a succinct review of former records of trypanosomes found in rabbits, all of which differ from the organism described by himself by being much shorter. It also shows dissimilarities from the large trypanosomes of cattle such as *T. theileri* and *T. ingens* by dimensions, folding of the membrane and position of the blepharoplast.

Cazalbou calls the new parasite *Trypanosoma gigas*.

The origin of the parasite is quite unknown. There were no fleas nor lice on the healthy parents of the victims, and mosquitoes from the neighbourhood have shown no evolutionary forms of flagellates.

H. B. F.

Doflein (F.). **Ueber Dauerformen und Immunität beim Froschtrypanosom.** [On the Resistant Forms and Immunity of the Trypanosome of the Frog.]—*Berichte der Naturforschenden Gesellschaft zu Freiburg i. Br.* Bericht über die Sitzung am 19. Feb. 1913.—1913. Mar. Vol. 20.

The author reviews briefly his work on *Trypanosoma rotatorium* of the frog, together with that of Ogawa and Mendeleeff-Goldberg. The main results of the research were as follows:—In the blood and internal organs of frogs, trypanosomes intermediate between the flagellate and nonflagellate stages were found. Cultures gave similar results. The nonflagellate forms appear to have lost the power of division. Very small nonflagellate forms about 1½μ in diameter occur in old cultures; they are resistant forms, resembling the latent forms of pathogenic trypanosomes, and are capable of starting new cultures. *T. rotatorium* in cultures shows physiological variation in regard to fat storage and osmotic relations, together with morphological variation. Much fat occurs as reserve food material in the small, cultural trypanosomes, a little fat only in the trypanosomes of frog's blood. The variations of blood and cultural forms are ascribed to adaptive processes. Transplantation of trypanosomes from blood to culture causes reappearance of the multiplicative capacity.

No disease symptoms occur in infected frogs, which usually contain few trypanosomes. By analogy with Texas fever, a

trypanosome infection may manifest itself heavily in the tadpole stage and become latent at metamorphosis, the adult thenceforth acting as a reservoir of the parasite.

Whilst the trypanosomes die but remain undissolved in the blood of toads, tree frogs, trout, leeches, guinea-pigs, rabbits, goats, and men, they are rapidly killed and dissolved in blood from infected frogs. The frog, then, is specifically immune to *T. rotatorium*. A substance is formed in the blood of infected frogs which reacts on cultural trypanosomes but not on the large blood trypanosomes. Intraperitoneal inoculation of tadpoles is easy. The tadpole can be observed for 14 days. In them the trypanosomes enlarge and gradually assume a form similar to the large blood trypanosomes.

The power of immunity of the trypanosomes in the blood may be associated with the firm structure of the pellicle and surface protoplasm of the organism. The membrane formation is thought to be dependent on the amount of fat in the body, and its variation in form in blood and cultural trypanosomes is due to the diversity in maximum growth and capacity for division. The acquisition of immunity is said to be connected in some way with the appearance and growth of the membrane.

H. B. F.

von Schuckmann (W.) & Wernicke (K.). **Einiges über Methoden und Ergebnisse der Trypanosomenzüchtung.** [Methods and Results of Trypanosome Cultivation].—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 1. Vol. 68. No. 2. pp. 241-255. With 1 text-figure.

The authors sought to improve on the medium and method of MacNeal and Novy because of the difficulty of obtaining rabbits, rats, guinea-pigs and other experimental animals, and the danger of contamination of the medium, especially during defibrination.

They made a large number of experiments. When the medium was ready the tubes were closed with melted paraffin, in order to prevent evaporation of the water of condensation, an improvement on the india-rubber caps used by Novy. They consider that the size of the tubes generally used is disadvantageous, the large quantity of air favouring evaporation; they therefore employed serum diagnosis tubes 10 cm. in length and 13 mm. in diameter. Systematic experiments were made with various kinds of blood and with mixtures, five parts of serum of one animal being mixed with one part of blood corpuscles from another. Rabbits, guinea-pigs, goats, and cattle were used. It was seen in the sequel that no kind of serum or blood was especially favourable to the growth of the trypanosomes used, almost exclusively those of birds, especially the wood owl and the little owl; *T. lewisi* was also employed. With regard to cattle, trypanosomes have been several times cultivated from their blood; it is therefore necessary after the tubes have been prepared to sterilise them by fractional sterilisation. The authors have not used the method of Mathis, who heated his tubes to 120° C.

Sixty experiments are set forth in a table, in which is given the composition of the medium, the age of the medium, the number of tubes inoculated, the result, the duration of life of the culture, and the number of generations for which it was continued. The organisms used were partly the so-called Halteridium culture, and later *T. avium* from the little owl.

Lastly they made experiments to test the correctness of SCHAUDINN's view. They did not succeed in obtaining any proof of a genetic connection between Haemoproteus and Leucocytozoon on the one hand, and the so-called *T. avium* on the other. They doubt the correctness of the conclusion which M. MAYER formed from his researches (*Archiv f. Protistenkunde.* 1911. p. 232).

A. G. B.

PROTOZOOLOGY.

DOFLEIN (Franz) & KOEHLER (Otto). **Ueberblick über den Stamm der Protozoen.** [Survey of the Protozoa.]—*Handbuch der pathogenen Mikroorganismen*, Kolle u. Wassermann. 1912. 166 pp. 99 text-figs. (Verlag von Gustav Fischer in Jena.)

The article is only intended to be a short review of the Protozoa as a whole, and occupies 147 pages of text, followed by references to literature more or less complete. There is first a general account of the biology and morphology of the group, extending over 25 pages. The Protozoa are divided into (1) *Plasmodroma*, including Mastigophora, Sarcodina and Sporozoa and (2) *Ciliophora*, including Ciliata and Suctoria. Six and a half pages are devoted to the Trypanosomidae, including *Trypanosoma, Herpetomonas, Schizotrypanum, Endotrypanum* and *Leishmania*. The life-cycle of *Entamoeba coli* is illustrated by HARTMANN's well known diagram. A list of other species of Entamoebae is given.

The Sporozoa are well treated and illustrated in the sixty pages devoted to them. The last few pages contain a short account of the Ciliophora.

[While the article may appear disappointing to the student of tropical medicine, it must be remembered that other articles in the Handbuch are specially devoted to pathogenic Protozoa.

We must protest against the "Germanising" of the spelling of group and generic names. It is inaccurate to replace *c* by *k* in such names as Sarcosporidia, Macrostoma, Leucocytogregarina, Microsporidia, Actinomyxidia and Actinosphaerium.]

H. B. Fantham.

RONDONI (Pietro). **Sulla Classificazione dei Protozoi Emoparassiti: il Nuovo Ordine dei *Binucleati* (Hartmann).** [Classification of Protozoal Blood Parasites. Hartmann's Binucleata.] —*Lo Sperimentale*. 1913. Apr. 7. Vol. 67. No. 1. pp. 105-118.

This paper is a review of the Binucleata, a group instituted by HARTMANN for Flagellates possessing a nucleus and a blepharoplast. The author discusses the genera *Trypanosoma, Trypanoplasma, Herpetomonas, Crithidia* and allied forms, and their possible phylogeny. He mentions the blepharoplastless trypanosomes of WERBITZKI. He also discusses the relationship of the Spirochaetes to the Binucleata. He states that the group, though useful, is an artificial one, a fact which is now generally recognised.

H. B. F.

i. FRANCHINI (G.). **Un Nouveau Protozoaire parasite de l'Homme provenant du Brésil.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 156-158.

ii. FRANCHINI (G.) & MANTOVANI (Mario). **Di un Nuovo Parassita Protozoario trovato nel Sangue Periferico ed Epatico in un Caso di Infezione cronica mortale proveniente dal Brasile.** [New

Protozoal Parasite in the Blood of Man.]—*Ann. di Med. Navale e Coloniale.* 1913. Feb. Anno 19. Vol. 1. No. 2. pp. 125-138. With 1 coloured plate.

i. A new parasite has been found by Franchini in the blood of an Italian physician, who had resided in Brazil for 18 years. The man had enjoyed good health till three years ago when he noticed a general feebleness set in, but without loss of appetite or loss of weight. A year later, a tumefaction, hard and indolent, becoming as large as a pigeon's egg, formed in the right lateral cervical region of the neck. It was removed but the wound did not close, and a white non-purulent secretion appeared. Soon after, another tumefaction appeared in the same place. He returned to Italy, became anaemic, suffered from fever and entered hospital.

The fever, at first irregular, became almost quotidian, was preceded by shivering and followed by great perspiration. The spleen was somewhat enlarged, the liver gradually extended to the umbilicus, and in the right lobe a cyst of the size of an orange, which fluctuated, formed. Puncture of the cyst gave a thin, reddish liquid. On examination of the patient great anaemia and emaciation were observed; the tumefaction in the neck was the size of a nut and in contiguity with the lymphatic glands; lymphatic glands normal; urine with traces of albumin; blood showing acute anaemia, with leucopenia, no eosinophilia; negative Wasserman reaction; nothing special noted on spinal puncture. Blood examination gave neither malarial parasites, leishmania, spores, nor fungi. Cultures of blood on media appropriate to Blastomycetes were negative. In numerous smears of blood taken by finger puncture, a parasite, often free in the plasma, sometimes within erythrocytes and very rarely in leucocytes, occurred. It was found also in material from three liver punctures. It was present in the peripheral blood only during the febrile attacks. The parasites were hardly visible in fresh blood and did not seem to move. Smears stained with Giemsa showed oblong or pyriform parasites with black pigment, often with two masses of chromatin, one large and one small, and protoplasm containing vacuoles and chromatic granules. Parasites of the size of a red corpuscle, rounded, with several chromatic masses and one or two centrosomes were probably forms showing multiple division. Other forms, almost round and clearly encysted, were fairly abundant in blood obtained by liver puncture. Sometimes very small parasites occurred in the erythrocytes; exceptionally they occurred in leucocytes (probably phagocytosed).

Two parasites with flagella have been seen. The parasite has not been cultivated, and the author is awaiting the results of subinoculations.

Sections of the tumefaction have shown typical granulomatous tissue, some elements resembling the parasites.

Franchini is convinced, from numerous examinations, that this parasite cannot be identified with the known haematozoa. It behaves like a protozoon and more especially a flagellate. The name *Haemocystozoon brasiliense* is proposed for it.

The preparations have been examined by Professor LAVERAN, who considers that the organism is a new Haemoprotozoon.

ii. In the second paper, Franchini in collaboration with Mantovani describes the case at length and gives a coloured plate of 70 figures illustrating the parasite. There is little or nothing of essential importance in this longer account which is not set forth succinctly in the first paper. It may be noted that no pigmented parasites are figured.

H. B. F.

DE RAADT (O. L. E.). **Ueber einen bisher unbekannten menschlichen Krankheitserreger.** [A New Pathogenic Organism in Man.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Mar. 15. Vol. 68. No. 3-4. pp. 318-322. With 1 plate and 1 chart.

De Raadt believes that he has discovered a new excitant of human disease in small bodies found in the spleen of a patient in the lazaret of Long-Iram, Central Borneo. The patient was a soldier aged 44, born in Java (a Madurese). There was a previous history of malaria, the species not being stated. When he entered hospital, he had fever that set in without previous shivering. Blood examinations were negative for malaria. Splenic enlargement was present, but the liver was not palpable. The diagnosis varied between malaria tropica and typhoid. A temperature chart is given, together with the therapy in full of the case, the main feature of which was great emaciation and variability in the size of the spleen. Details of the post mortem made immediately after death are given. The most noticeable points were:—

The lungs were heavily pigmented. The spleen weighed 200 grams and on its capsule being cut the pulp gushed out. The liver weighed 1,350 grams. It showed no cirrhosis. The conclusion from the post-mortem was that an infectious disease was highly probable.

Seven spleen smears had been made. They were stained with Giemsa from 1 to 24 hours and some were restained with Heidenhain's haematoxylin. The author details the results under four heads:—

(1) *Form, structure and size.* The organisms are usually ring-like with a large vacuole. The alveolar protoplasm collects at one side of the vacuole. No nucleus is present as such, though scattered granules of chromatin appear in some on using Heidenhain's stain. Pear shaped forms, also enucleate, occur. The structures vary from the most minute dimensions to 3μ.

(2) *Multiplication.* This is two-fold: (1) by budding, (2) by fission into two.

(3) *Occurrence in definite body cells.* They are rarely intraglobular, but are often within the large mononuclear leucocytes, without, however, showing intraphagocytic degeneration. Sometimes they are embedded in a matrix similar to that derived from the bursting of leucocytes. They are often quite free in the blood plasma.

(4) *Staining capacity.* Giemsa colours the protoplasm blue; there is no chromatin but violet dots may appear with intensive

staining. Heidenhain (after Giemsa) gives a grey-brown alveolar protoplasm, often with dark points or granules, but no individualised nucleus can be seen.

The author concludes that the minute bodies thus described are micro-organisms belonging to the Protozoa and probably related to *Babesia.* Von PROWAZEK, who saw the structures, first suggested the possibility of yeasts, but later considered they might be Protozoa of a new class. SWELLENGREBEL, who also saw them, considered them Protozoa on the ground of THEILER and BALFOUR'S work on *Anaplasma marginale.* ROCHA-LIMA tested the preparations from the fungus point of view and pronounced them Gram-fast. The author concludes by stating that on the ground of their very typical structure he has named these organisms *Ovoplasma anucleatum.*

He has now found the same structures in spleen smears of two other cases from Java. He thinks there is a possibility that the parasite in many cases may be relatively harmless, but under certain conditions may become pathogenic.

The coloured plate contains 17 figures, all showing the bodies.

H. B. F.

PATTON (W. S.). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia,* **and** *Rhynchoidomonas.* **No. I. The Morphology and Life History of** *Herpetomonas culicis,* **Novy, MacNeal, and Torrey.**—*Sci. Mems. by Officers of the Med. & Sanit. Depts., Govt. of India.* 1912. New Ser. No. 57. pp. 1-21. With 1 plate and 2 text-figures. Calcutta: Supt. Govt. Printing, India.

The author first defines the scope of the researches on *Herpetomonas, Crithidia* and *Rhynchoidomonas.* He points out that his views regarding the nature of the *Herpetomonas* of house-flies differ from those of certain other observers because he has worked with bred flies which have been infected experimentally while other workers have used flies caught at large. Consequently while he was able to follow the entire development of the flagellates and also to prevent mixed infections of flagellates such as occur in many insects, such a course is impossible when flies caught at large are used. Confusion of the flagellates of insects with pathogenic forms is easy unless the life-history of the parasites of the insect suspected of transmitting disease is known.

The flagellates of mosquitoes are then considered, and a detailed historical review of the records of *Herpetomonas* and *Crithidia* in the guts of mosquitoes is given. There is a great variation in the percentage of female mosquitoes that contain flagellates, depending largely on where the mosquitoes were taken. Mosquitoes collected from wells are nearly always infected with flagellates. Those bred from larvae in a tank are never infected—a point of importance in feeding experiments.

Patton points out that neither the parasite of Indian nor Italian kala azar will flagellate in any medium containing bacteria. Hence it is likely that FRANCHINI has encountered herpetomonads

natural to mosquitoes and not developmental forms of kala azar parasites.

The author details fully his methods of collecting and breeding the mosquitoes, and the technique employed in examination. *Culex fatigans*, *C. concolor* and *Joblotia* sp. all were breeding in the same tank. The first named only was ever found infected, pointing to the *Culex fatigans* being the specific host in Madras.

The preflagellate stages of *H. culicis* occur chiefly in the larval gut, occasionally in the gut of the nymph or imago. They are massed together just posterior to the junction of the Malpighian tubes with the midgut. Early forms are about 4μ in diameter and globular, and have vacuolated protoplasm with nuclei either central or to one side. A flagellar myoneme arises close to the blepharoplast. Binary fission occurs. No intracellular stage was ever seen. The multiplicative stage occurs in the gut of the larva but can also be found in the nymph or imago. Patton's experiments show clearly that the food of the insect has a direct bearing on the life of its Herpetomonas, for if the larvae are starved by being kept in clean water, the development of the flagellate is retarded and the mature insects hatch out still containing the preflagellate stages of the parasite, which have a great resemblance to the parasites of kala azar as liberated from leucocytes. There are, then, grave risks of misinterpretation should such insects be used for feeding experiments.

The growth of flagella in the preflagellate stages usually occurs in the larval gut just as the larva is about to become a nymph. They may flagellate singly or form rosettes. In rosette formation, nucleus and blepharoplast divide repeatedly and the daughter blepharoplasts are directed towards the centre. The mature flagellate, best seen in the gut of the imago as it emerges from the nymph, is from 15μ to 25μ by 3μ to 5μ. The flagellum may be 25μ to 40μ long.

The effect of different foods on the flagellates was tried. Banana supplied to larvae caused the flagellates to disappear, as the fruit developed yeasts that killed the flagellates. Meals of human blood killed the flagellates in practically every case. A similar result occurs when bugs ingest human blood and the fresh blood comes in contact with the flagellates of kala azar. These experiments probably give the clue as to how a harmless flagellate may evolve into a pathogenic one.

The post-flagellate stages are most easily studied in the male mosquito, which will live in captivity for a short time with little or no food. The flagellates fix themselves by their flagellar ends to the intestinal wall and divide there very regularly, so that palisades of them occur. The post-flagellates adhere together and are then passed out en masse with the faeces.

The author concludes that *H. culicis* is a natural parasite of *Culex fatigans* and is in no way connected with any blood parasite. It and many of its allied forms must be rigorously excluded in any experiments carried out with mosquitoes and the parasites of kala azar and oriental sore.

H. B. F.

CHATTON (Edouard) & LEGER (Marcel). **L'Autonomie des Trypanosomes propres aux Muscides démontrée par les Elevages purs Indéfinis.**—*Compt. Rend. Soc. Biol.* 1913. Mar. 14. Vol. 74. No. 10. pp. 549-551.

The authors first review briefly some of the literature relating to the flagellates of flies from 1908 when CHATTON and ALILAIRE announced the coexistence of a trypanosome and a Leptomonas in a Drosophilid fly. They refer next to the announcement of Chatton and A. LÉGER (1911) of the dualistic hypothesis regarding the "eutrypanosomes" of the Malpighian tubules and the trypanosome-forms (leptotrypanosomes or trypanoïdes) of the intestinal Leptomonas. They refer also to the fact that they obtained pure strains of Leptomonas and of trypanosomes [see this *Bulletin*, Vol. 1, p. 499]. These pure strains have been maintained.

The pure trypanosomes, found in 80 per cent. of the infected flies, have been kept for two years and flies containing trypanosomes have been given to other workers who have been able to follow them up in their own laboratories. They have never shown Leptomonas.

Similarly the Leptomonas maintained for one year, though less successfully, has never contained trypanosomes. The difference of success in raising Leptomonas and trypanosomes is considered to be due to the varying chemical composition of the intestinal medium compared with that of the Malpighian tubules.

The authors consider that the specific autonomy of the trypanosome of the Drosophilae is definitely fixed. They also consider that "this demonstration holds for all flagellates of the same type described in Muscidae." [Surely this is generalising far too widely from a single particular case.]

In conclusion, the discovery by one of the authors of a Malpighian trypanosome in the house flies of Bastia, Corsica, is announced. As its cysts differ clearly from those of *T. drosophilae*, *T. luciliae* of PATTON [PATTON did not describe the parasite as a trypanosome] and *T. intestinalis* of ROUBAUD, it is designated by the author as *T. muscae domesticae.*

H. B. F.

CHATTON (Edouard). **Position Systématique et Signification Phylogénique des Trypanosomes Malpighiens des Muscides. Le Genre *Rhynchoidomonas* Patton.**—*Compt. Rend. Soc. Biol.* 1913. Mar. 14. Vol. 74. No. 10. pp. 551-553.

PATTON in 1910 stated that certain flagellates which he found in the Malpighian tubes of *Lucilia serenissima* were autonomous and belonged to a new genus, *Rhynchoidomonas.* ROUBAUD, working on allied forms, also considered them autonomous and placed them in the sub-genus *Cystotrypanosoma* [see *Sleeping Sickness Bulletin*, Vol. 4, p. 191]. ALEXEIEFF recently placed them in the genus *Crithidia.*

PATTON defined *Rhynchoidomonas* by the absence of free flagellum, postnuclear position of the blepharoplast, and lengthening of the posterior extremity of the body, all characters

occurring, according to Chatton, in sanguicolous trypanosomes Thus defined, Chatton considers *Rhynchoidomonas* a synonym for *Trypanosoma*. Malpighian trypanosomes of the type *T. drosophilae* encyst by flexion of the body into a U, while *Crithidia*, *Leptomonas*, *Herpetomonas* and *T. grayi* encyst by contraction of the body. In fission, *T. drosophilae* begins to divide at the posterior pole, while the sanguicolous trypanosomes, *Crithidia*, and *T. grayi* begin by the anterior pole. *T. drosophilae* has its blepharoplast constantly postnuclear; *Crithidia*, *T. grayi* and cultural and evolutionary forms of sanguicolous trypanosomes have ante-nuclear blepharoplasts. Chatton also discusses the ethological characters of these flagellates. He considers it necessary to re-institute the genus *Rhynchoidomonas* for the Malpighian trypanosomes, characterised thus:—

Encystment by flexion, posterior fission, blepharoplast constantly post-nuclear; parasites specialised to Muscidae. Type of genus: *Rhynchoidomonas drosophilae* (Chatton et Alilaire, 1908).

This definition excludes *T. grayi*, which only differs from a typical *Crithidia* by the frequency of forms with a post-nuclear blepharoplast.

H. B. F.

Rodhain (J.). **A propos de** *Leptomonas pangoniae* **et** *Trypanosoma denysi*. **Note Rectificative.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 181-182.

While in Africa Rodhain and his colleagues described, under the name *Leptomonas pangoniae*, a parasitic flagellate from the intestinal tract of *Pangonia infusca* in Bas-Katanga (this *Bulletin*, Vol. 1, p. 154). On returning to Europe they find that the flagellate must be placed in the genus *Crithidia* of Patton and Strickland. Hence the name of the parasite is *Crithidia pangoniae*.

Further, in October 1912 they described a flagellate, *Trypanosoma denysi*, from the blood of the flying squirrel of Katanga. While in Africa the squirrel was identified as *Pteromys volant* inaccurately; the host is really *Anomalurus fraseri*.

H. B. F.

Rodhain (J.), Pons (C.), Vandenbranden (F.), & Bequaert (J.). **Note sur des Trypanosomides intestinaux d'Haematopota au Congo Belge.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 182-184. With 1 text-figure.

The paper contains a short account of two flagellates parasitic in the alimentary tracts of *Haematopota duttoni* and *H. vandenbrandeni* respectively. The parasite of *Haematopota duttoni*, found at Kasongo, was present in the rectum of two female flies out of eleven examined. Flagellated and cystic forms were present. The mobile parasites, large and stumpy, resemble fairly those figured by Bruce, Hamerton, and Bateman as occurring in *Tabanus secedens*. [It should be remembered that

these parasites were the *Crithidia tabani*, described prior to BRUCE by PATTON.] Pyriform or oval cysts corresponded to the "spermoides" of CHATTON.

At Sankisia another flagellate was found in *Haematopota vandenbrandeni;* 39 females were dissected, but only one was parasitised. Intestinal smears showed flagellated forms and cysts.

The flagellates had the form of a long narrow Crithidia with a pointed posterior extremity and narrow undulating membrane. The largest forms are from 45μ to 50μ long, with a body length of 28μ to 30μ and free flagella of 16μ to 18μ. The mean breadth at the level of the nucleus is 1·2μ and does not exceed 2μ. The nucleus is 10μ to 14μ from the anterior end of the body, possesses no karyosome but has scattered chromatic granules. Its dimensions are 2·18μ by 1·2μ.

The punctiform blepharoplast is 2μ to 4μ in front of the nucleus, and a relatively thick flagellum abuts on it. The cytoplasm of the posterior end has metachromatic granules frequently. The anterior part gradually merges into the free flagellum, the undulating membrane lying close to the body.

Smaller flagellates, only 31μ to 39μ, of which 9μ to 16μ forms the free flagellum, and having a breadth not exceeding 1μ, also occur. Between the flagellates and the encysted stages no intermediate forms occurred.

The cysts are surrounded by a thin, eosinophilic coat. They are ovoid, measuring 5μ to 6μ by 2μ, and the nucleus and blepharoplast are contained in the wider part of the cyst. Together with these cysts, aflagellar forms occur which the authors believe to be the first stages of condensation prior to encystment. The shortened, club-like bodies are 14μ by 4μ at the base, have deep staining protoplasm, and nucleus and blepharoplast very near each other.

The authors name this flagellate *Crithidia tenuis* and consider that it is probably a parasite peculiar to *Haematopota vandenbrandeni.*

The text figure illustrates various stages of *C. tenuis.*

H. B. F.

FANTHAM (H. B.). **Note on the Specific Name of the *Herpetomonas* found in the Dog-flea, *Ctenocephalus canis*.**—*Bull. Soc. Path. Exot.* 1913. Apr. Vol. 6. No. 4. pp. 254-255.

The author points out that he named the Herpetomonas found in the gut of the dog-flea *H. ctenocephali* in July last. He briefly reviews the literature relating to the flagellate and remarks that the specific name *H. pseudoleishmania* proposed by BRUMPT (see this *Bulletin* Vol. 1, p. 669, footnote) cannot stand.

W. YORKE.

LAVERAN (A.) & MARULLAZ (M.). **Au Sujet des Toxoplasmes du Lapin et du Gondi.**—*Compt. Rend. Acad. Sciences.* 1913. Mar. 25. Vol. 156. No. 12. pp. 933-936.

The authors briefly survey the literature relating to *Toxoplasma,* which was discovered by A. SPLENDORE (1908) in an

epizoötic among rabbits in Brazil. A similar parasite was recorded shortly afterwards by NICOLLE and MANCEAUX from the gondi (*Ctenodactylus gondii*), a rodent allied to the guinea-pig, occurring in Tunisia.

The present work was undertaken to try to establish the identity or otherwise of *Toxoplasma cuniculi* of the rabbit and *T. gondii.* There are very great morphological similarities between the two parasites, strongly favouring their identity. Biological characters might show distinctions; hence they were tried, chiefly from the point of view of inoculability to the same species of animals.

T. cuniculi has been successfully inoculated to the rabbit, guinea-pig, pigeon, several Passerine birds, *Euphonia,* and unsuccessfully to the white rat.

T. gondii has been successfully inoculated to the gondi, guinea-pig, mouse, pigeon and Java sparrow, and unsuccessfully to *Macacus,* dog, white rat and rabbit.

Laveran and Marullaz investigated the inoculability of *T. gondii* (sent by C. NICOLLE) and find a difference regarding the reaction of the virus in the rabbit from what was found by C. NICOLLE and CONOR. Intraperitoneal inoculation of rabbits only succeeded with great difficulty (one case out of three and in that, a young rabbit, the parasites were very rare). An intravenous inoculation of one young rabbit succeeded easily, producing general infection with numerous free and dividing parasites in the internal organs, especially in the spleen and liver.

Laveran and Marullaz consider their experiments show that *T. gondii* can produce an infection in the rabbit (especially in young animals) comparable with that produced by *T. cuniculi.* Both are inoculable to pigeons. Finally they mention that a natural toxoplasmosis of the rabbit has been observed by G. BOURRET at St. Louis, Senegal. The authors in conclusion state that without wishing to assert definitely the identity of *T. cuniculi* and *T. gondii,* yet the arguments in favour of such identity appear to possess considerable weight.

H. B. F.

NICOLLE (Charles) & CONOR (Marthe). **La Toxoplasmose du Gondi. Maladie naturelle. Maladie expérimentale.**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 160-165.

LAVERAN (A.) & NATTAN-LARRIER. **Au Sujet des Altérations anatomiques produites par le** *Toxoplasma cuniculi.*—*Ibid.* Mar. No. 3. pp. 158-160.

LAVERAN (A.) & MARULLAZ (M.). **Infections du Lapin par le** *Toxoplasma gondii.*—*Ibid.* Apr. No. 4. pp. 249-254.

Nicolle and Conor describe the evolution of *T. gondii* in the gondi, mouse, guinea-pig and pigeon. There are indications of a seasonal periodicity of infection. The number of parasites in the organs varies, the spleen, liver and lungs, kidneys, blood and bone marrow being successively less parasitised. Multiplicative forms of the parasite were numerous. The cysts of

Splendore are considered as agglomerations by the present authors. By experiments they have established that the toxoplasm of the gondi can be maintained in laboratories in mice and pigeons. In mice and guinea-pigs the infection is local, in the pigeon it is generalised. Nicolle and Conor consider *T. gondii* is different from *T. cuniculi.*

Laveran and Nattan-Larrier have examined the anatomical alterations produced by toxoplasms in the liver, spleen and lungs of rabbits. The liver showed numerous necrotic nodules, varying in size up to 1 mm. in diameter. The infected hepatic cells usually contained 8 or 10 parasites, while 20 to 30 were sometimes present. The spleen showed much congestion and ochreous pigment was present. The lesions were less systematised than in the liver. The lungs showed nodular lesions, accompanied by oedema and congestion. Full details of the structure of the necrotic areas of each organ are given.

Laveran and Marullaz in the present paper give details of their experiments with *T. gondii* in rabbits, the main results of which are given in their paper reviewed above. They suggest that toxoplasms secrete an irritant toxin producing necrosis. The parasitised animals become thin and anaemic.

H. B. F.

Flu (P. C.). **Over een Prowazekiavorm** (*Prowazekia Javanense*) **in de ontlasting van een Patient te Weltevreden.** [On a Species of Prowazekia (*P. javanense*) in the Faeces of a Patient from Weltevreden.]—*Geneesk. Tijdschr. v. Neder.-Indië.* 1912. Vol. 52. No. 6. pp. 659-678. With 1 plate.

The author investigated agar cultures of a flagellate obtained from the faeces of a patient from Weltevreden, Java. The flagellates grew abundantly on all kinds of nutrient media, but best of all on ordinary, slightly alkaline, nutrient agar, and remained alive for fourteen days, and on one occasion as long as three weeks. In older cultures cysts were found as well as motile forms. The optimum temperature for their growth appeared to be 26° C. The parasites were examined in both fresh and stained preparations. The organisms are 12μ long and 5μ broad, showing an oblong, broad lancet shape. There are also shorter and stouter forms, which are pear-shaped and on one occasion small, almost round parasites were seen. The flagella are anterior and lateral respectively, but the lateral flagellum is attached for a short distance to the cell body, becoming free posteriorly.

A cytological study of the flagellate was made. The central nucleus possesses a karyosome, and there is a large blepharoplast which is well seen in life. The two flagella arise from basal granules, near to which there is probably a small cytostome. Regarding the karyosome, the author states that the smaller the karyosome the more chromatin is deposited on the nuclear membrane. Apparently cyclic changes occur in the karyosome. Numerous food vacuoles may occur in the posterior part of the

body. Multiplication takes place by longitudinal fission. Details of encystment are given. The occurrence of autogamy is uncertain.

Regarding the question of the species of Prowazekia described in the paper, the author compares it with *P. cruzi*, *P. asiatica* and *P. weinbergi*. He proposes to name his species *Prowazekia javanense*, but states that the name is merely a temporary one, as in course of time it may be shown that there is only one species of Prowazekia, as believed by Doflein. The author thinks that perhaps the species *asiatica*, *weinbergi*, and *javanense* will ultimately prove to be the same and then the parasite described by him will be called *Prowazekia asiatica* (Castellani and Chalmers).

The paper is illustrated by a plate of 34 figures.

H. B. F.

Chatton (E.) & Roubaud (E.). **Sporogonie d'une Hémogrégarine chez une Tsétsé (*Glossina palpalis* R. Desv.)**—*Bull. Soc. Path. Exot.* 1913. Mar. Vol. 6. No. 3. pp. 226-233. With 2 plates.

The authors describe what they consider to be sporogony of a haemogregarine in *Glossina palpalis*. The flies were captured at Kolda, on the banks of the Casamance. Infected flies occurred only in this neighbourhood. Four were infected out of 465. The parasites were found in the body cavity of the flies. When examined fresh, the presence of the cover-glass was sufficient to cause the bursting of the cysts, issue of sporocysts and subsequently of motile sporozoites. Stages corresponding to copulation were lacking. The youngest forms were sub-spherical, voluminous, uninucleate, 50μ to 75μ. A thin membrane was present. The nucleus showed a central karyosome. Next a dozen large, plumose chromosomes replaced the karyosome. The authors think that if the subsequent stages were known they would resemble those of certain Gregarines and Coccidia. Each chromosome becomes a daughter nucleus, and the daughter nuclei themselves multiply by a division more of the Coccidian than of the Gregarine type. The nuclei at first are distributed but later collect at the periphery, where ultimately a series of uninucleate prominences are produced. Each prominence or bud ultimately detaches itself, and its volume doubles as it does so, whereby it becomes 10μ to 12μ in diameter. These buds or sporoblasts use the central residuum of their parent as food and when this is exhausted they measure 20μ to 25μ. Sporozoite formation follows. The binucleate stage of the sporoblast is somewhat prolonged but succeeding divisions are quicker. It is again noted that the divisions are of the Coccidian type and analogous with those of *C. schubergi* and *Adelea zonata*. The nuclei become arranged in two parallel planes. The lines of separation are at right angles to these planes. The sporocyst contains as many sporozoites as there were nuclei, i.e., more than 20. The

cysts contain a hundred sporocysts. Isolated vermicular sporozoites when stained with Giemsa show a red nucleus at the posterior third of the body and on either side of it an area staining intensely violet.

The affinities of the parasite are discussed. The authors arrive at the conclusion that it is part of the cycle of a haemogregarine, either mammalian or reptilian. Finally they think that this parasite of *Glossina palpalis* is the sporogonic stage of a Haemogregarine of a reptile, such as Varanus, Crocodilus or a lizard.

The paper is well illustrated.

[Are the authors sure that the organism examined is not a natural parasite of *Glossina palpalis*?]

H. B. F.

LEGER (André). **Parasite des Hématies, Genre** *Grahamella* **(Brumpt), de** *Mus maurus*, **(Gray).**—*Bull. Soc. Path. Exot.* 1913. Apr. Vol. 6. No. 4. pp. 247-249.

Léger reviews the previous accounts of *Grahamella*, first discovered by GRAHAM-SMITH in 1905 in the erythrocytes of the mole, found by THOMSON in 1906 in the same animal, by BALFOUR in the jerboa, by FRANÇA in the dormouse and field mouse, and by BRUMPT in 1911 in mole's blood again. BRUMPT considered the rod-like structures to be true protozoa and founded the genus *Grahamella* for their reception. Léger has now found similar structures in the erythrocytes of *Mus maurus*, the rat of Bamako, Haut-Sénégal-Niger. He found them in 28 animals out of 125 examined. The number of bodies in each erythrocyte varied between 30 and 80. Infection of peripheral blood was poor, that of heart blood relatively heavier.

Attempts at the experimental infection of other *Mus maurus*, guinea-pigs and rabbits have failed, whether intravenous, intraperitoneal or subcutaneous inoculation were employed.

H. B. F.

NEGRI (Adelchi). **Beobachtungen über** *Haemoproteus*. — *Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Apr. 23. Vol. 68. No. 7. pp. 599-602. With 1 coloured plate.

The author reviews the previous work of SCHAUDINN on *Haemoproteus* (*Halteridium*) *noctuae* and of ARAGAO on *H. columbae*. He worked more especially on the latter parasite. He obtained his infected doves from the Roman Campagna, and found all the forms which have been described from the peripheral blood and from the leucocytes in the lungs. He confirms ARAGAO's work thereon.

No *Lynchia* were found on the doves, so that the author could not investigate the stages in the invertebrate host. Although he had abundant infected material he was unable to confirm SCHAUDINN's statements regarding a developmental relationship between *Halteridium* and *Trypanosoma*. No intermediate forms between these types were seen, nor were flagellates of any kind obtained in blood cultures.

The paper is illustrated by a coloured plate of four figures, showing the minute merozoite forms of *H. columbae* in the lungs.

H. B. F.

AWERINZEW (S.). **Ergebnisse der Untersuchungen über parasitische Protozoen der tropischen Region Afrikas. I.** [Researches on the Parasitic Protozoa of Tropical Africa. I.]—*Zoologischer Anzeiger.* 1913. Jan. 3. Vol. 41. No. 4. pp. 186-188.

The author states that this paper is the first of a series of preliminary communications on his investigations at Daressalam, Amani, Zanzibar, Delagoa Bay, Durban and other places in East Africa. The present paper relates to a protozoan parasite from the blood of the frog, *Rana nutti*, the host being found in the neighbourhood of the Imperial Biological and Agricultural Institute at Amani, German East Africa.

The parasites occurring in the red blood corpuscles of *Rana nutti* at first were considered as true haemogregarines. Examination of stained preparations led the author to place them in the Binucleata, apparently as descendants from trypanosome-like stocks.

The parasites in the red blood corpuscles as well as those in the plasma show two tiny bodies in their broad stumpy ends. These two small bodies take up nuclear stains. The author emphasises that the occurrence of these granules is the general rule. In a few cases he has been able to find a connection between one of these small bodies and the nucleus, and figures one example of this. He has never seen a vestige of a flagellum or undulating membrane in these parasites and, in his opinion, the gregarine-like blood parasites can be placed either with the Coccidia or with the Trypanosomes, as well as with the Piroplasmidae and Plasmodiidae.

A new generic name is necessary to avoid confusion arising from the two-fold origin (and therefore also two-fold structure) of these organisms known as haemogregarines.

In a few cases some of the free swimming forms in the blood of *Rana nutti* showed a long ribbon-like nucleus resembling what PROWAZEK described in the Haemogregarines of the gecko, *Platydactylus guttatus*, but filling nearly the entire cell. The plastin takes no share in this nuclear growth. In some frogs only forms rich in chromatin occurred and then in small numbers. In other cases along with erythrocytic parasites there were masses of free haemogregarine-like forms of which a few had enlarged nuclei, but the greater number possessed a small compact nucleus, near which a few chromatin lumps lay sometimes. Those parasites, which show increase of nuclear chromatin, were two to three times as large as the others. Whether male, female and indifferent forms were present is undecided. In conclusion it is stated that apparently sexual processes as well as ordinary multiplication take place in the body of the frog, but no further information is given regarding these points.

The paper is illustrated by four text figures.

H. B. F.

VIGUIER (G.) & WEBER (A.). i. **Les Mitochondries de l' *Haemogregarina sergentium* durant son Evolution dans le Sang du Gongyle.**—*Compt. Rend. Soc. Biol.* 1913. Apr. 11. Vol. 74. No. 12. pp. 664-666.

ii. **Nouvelles Observations sur l'Altération des Hématies sous l'Influence d'une Hémogrégarine chez le Gongyle.** — *Ibid.* Apr. 18. No. 13. pp. 760-761.

i. The authors have studied the mitochondria* of *Haemogregarina sergentium* of the lizard, *Gongylus* sp., from the time of the penetration of the merozoite into the erythrocyte until the destruction of the host cell. Free merozoites are 3μ to 6μ long. They each contain fine chromatic aggregations resembling a karyosome, whose extremities are fairly often covered by two semilunar masses where one or two mitochondrial granulations occur. At the time of penetration the merozoite elongates and the mitochondria, which are fine, are in about a dozen groups or are irregularly distributed. Some suggest multiplicative stages. One group of mitochondria is always near the nucleus, another at one extremity. Vesicles, which stain like mitochondria and perhaps may result from their alteration, may be present.

At a certain stage, the mitochondria which are then numerous become scattered throughout the cytoplasm. In addition grains staining like the nucleus make their appearance (extra-nuclear chromatin or chromidial apparatus). As the haemogregarine grows, the mitochondria arrange themselves at the periphery, and simultaneously the capsule of the haemogregarine appears, and these phenomena may not be unrelated.

In still older organisms, the mitochondria become few and very scattered, while in haemogregarines that seem degenerated within the red cells the mitochondria have disappeared.

ii. In the second note the authors briefly refer to the alterations of the erythrocytes by the Haemogregarine, as seen in the blood of one reptile (*Gongylus*) out of 13 parasitised, the red cells of the others exhibiting no particular alterations. In the case discussed, fragmentation of the nuclei of the red cells occurred. Mitochondria were also demonstrated by special methods (those of REGAUD).

H. B. F.

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* "Amongst the granulations of the protoplasm, special mention must be made of the bodies known generally as *chondriosomes* and *mitochondria* . . . The chondriosomes are not to be classed with the temporary, metaplastic inclusions, but are permanent elements of the cell-protoplasm. The chondriosomes of Protozoa have recently been the subject of detailed study by Fauré-Fremiet. In the living condition they are small transparent bodies, feebly refractile, and of a pale grey tint. In shape they are generally spherical, and vary from $0{\cdot}5\mu$ to $1{\cdot}5\mu$ in diameter . . . When the nucleus (in Infusoria the micronucleus) divides, the chondriosomes also divide simultaneously, and the daughter-chondriosomes are sorted out between the two daughter-cells ; they have, however, no direct relation with the nuclear apparatus . . . Fauré-Fremiet considers that they "play an important part in the life and evolution of the sexual cell," in Protozoa or Metazoa." (MINCHIN (E. A.). An Introduction to the Study of the Protozoa with Special Reference to the Parasitic Forms. 1912. London : Edward Arnold. p 41.)

Flu (P. C.). **Over de z.g.n. Kurlofflichamen in de mononukleaire Bloedcellen van** *Cavia cobaya.* **I. Morphologische Studiën.** [On the so-called Kurloff Bodies in the Mononuclear Blood-Cells of *Cavia cobaya.*]—*Geneesk. Tijdschr. v. Neder.-Indië.* 1912. Vol. 52. No. 6. pp. 679-702. With 1 coloured plate.

The author reviews the previous work done on the subject and discusses the different opinions held by various investigators as to the nature of the Kurloff bodies. He refers to his previous work with Pappenheim in Berlin. The investigations here recorded were done in Weltevreden (Java) where 100 per cent. of the guinea-pigs examined were found to be infected and 25 to 40 per cent. of their monocytes contained Kurloff bodies, while only 30 per cent. of the animals were infected in Berlin and 10 to 12 per cent. of the monocytes contained the bodies.

The bodies were examined intra vitam and by various methods of fixation and staining.

The author concludes:

(1) That the Kurloff bodies possess movements of their own.

(2) That the movement is an amoeboid one and is performed by the peripheral as well as by the central parts of the body; hence it is improbable that the poorly staining mass of the Kurloff bodies, termed by the author 'ground substance,' is a reaction-product of the mononuclears.

(3) That by staining Kurloff bodies fixed in sublimate solution with Loeffler's methylene blue, morphological appearances are obtained which correspond closely with those of the so-called Chlamydozoa.

The paper is illustrated by a coloured plate, containing 39 figures.

H. B. F.

Ponselle (A.). **Culture** *in vitro* **du** *Trypanoplasma varium* **Leger.**—*Compt. Rend. Soc. Biol.* 1913. Apr. 11. Vol. 74. No. 12. pp. 685-688.

Ponselle has succeeded in cultivating *Trypanoplasma varium,* parasitic in the blood of the loach, *Cobitis barbatula,* L. At first he obtained mixed cultures of *Trypanoplasma varium* and *Trypanosoma barbatulae,* both parasitic in the loach. Care was then taken to procure a droplet of cultural blood containing trypanoplasms only, unmixed with trypanosomes. The cultures were made in a medium previously devised for the culture of trypanosomes (see this *Bulletin* Vol. 1, p. 676 and Erratum below), using also a modified Petri dish known as a "boîte de Bordas" for hanging drop cultures. Two passages from tube to tube have now succeeded. The cultural forms of the Trypanoplasma differ very little from the blood forms. The same disposition of nucleus, blepharoplast, and flagella and the same dimensions occur, while the movements are alike. The undulating membrane, however, is much reduced, and the posterior flagellum is free from the body for a greater or less distance, and so the cultural forms somewhat recall

Prowazekia. Division is always binary and longitudinal, nuclear division either preceding or accompanying that of the blepharoplast, as a rule.

No elongate, thin forms, similar to those occurring in the alimentary tracts of leeches feeding on infected fish, have been observed; nor have forms suggesting sexuality been seen.

The note is illustrated by 15 text-figures, and there is one figure of a cultural *Trypanosoma barbatulae* in addition.

H. B. F.

Erratum.

Bulletin Vol. 1, No. 11, p. 676. In the formula of Ponselle's modification of the N.N. medium, for 'unwashed gelatine' read 'unwashed agar.'

TROPICAL DISEASES BUREAU LIBRARY.

List of periodicals received.

EUROPE.

Great Britain.

Annals of Tropical Medicine & Parasitology (Liverpool).
British Medical Journal (London).
Bulletin of Entomological Research (London).
Edinburgh Medical Journal.
Glasgow Medical Journal.
Journal of the Board of Agriculture and Fisheries (London).
Journal of Comparative Pathology & Therapeutics (Edinburgh & London).
Journal of the Department of Agriculture and Technical Instruction for Ireland (Dublin).
Journal of Hygiene (Cambridge).
Journal of the London School of Tropical Medicine (London).
Journal of Pathology & Bacteriology (Cambridge).
Journal of the Royal Army Medical Corps (London).
Journal of State Medicine (London).
Journal of Tropical Medicine & Hygiene (London).
Lancet (London).
Lister Institute of Preventive Medicine: Collected Papers (London).
Parasitology (Cambridge).
Proceedings of the Royal Society, Series B. (London).
Public Health (London).
Review of Applied Entomology. Series A: Agricultural. Series B: Medical & Veterinary (London).
Transactions of the Society of Tropical Medicine & Hygiene (London).
Veterinary Journal (London).
Veterinary News (London).
Veterinary Record (London).
Yellow Fever Bureau Bulletin (Liverpool).

France.

Annales d'Hygiène et de Médecine Coloniales (Paris).
Annales de l'Institut Pasteur (Paris).
Archives de Médecine et Pharmacie Navales (Paris).
Archives de Parasitologie (Paris).
Bulletin de l'Institut Pasteur (Paris).
Bulletin de l'Office International d'Hygiène Publique (Paris).
Bulletin de la Société de Pathologie Exotique (Paris).
Le Caducée (Paris).
Comptes Rendus de la Société de Biologie (Paris).
Recueil de Médecine Vétérinaire (Alfort).
Répertoire de Police Sanitaire Vétérinaire (Paris).
Revue de Médecine et d'Hygiène Tropicales (Paris).
Revue Générale de Médecine Vétérinaire (Lyons).
Revue Vétérinaire (Toulouse).
La Semaine Médicale (Paris).

Germany.

Arbeiten aus dem Kaiserlichen Gesundheitsamte (Berlin).
Archiv für Schiffs- und Tropen-Hygiene (Leipzig).
Centralblatt für Bakteriologie. 1. Abteilung. Originale & Referate (Jena).
Dermatologisches Wochenschrift (Leipzig).
Deutsche Medizinische Wochenschrift (Berlin).
Deutsche Militärärztliche Zeitschrift (Berlin).
Deutsche Tierärztliche Wochenschrift (Hanover).
Lepra. Bibliotheca internationalis (Leipzig).
Mitteilungen aus dem Zoologischen Museum in Berlin.

GERMANY—*continued.*

Zeitschrift für Chemotherapie und verwandte Gebiete. 1. Teil., Originale (Leipzig).
Zeitschrift für Hygiene und Infektionskrankheiten (Leipzig).
Zeitschrift für Veterinärkunde (Berlin).

AUSTRIA.

Wiener Klinische Wochenschrift (Vienna).

ITALY.

Annali d'Igiene Sperimentale (Rome).
Annali di Medicina Navale e Coloniale (Rome).
Atti della Accademia Gioenia di Scienze Naturali in Catania.
Atti della Società per gli Studi della Malaria (Rome).
Bollettino delle Sedute della Accademia Gioenia di Scienze Naturali in Catania.
Clinica Veterinaria (Milan).
Gazzetta Internazionale di Medicina, Chirurgia, Igiene, &c. (Naples).
Giornale della R. Accademia di Medicina di Torina.
Giornale della Reale Società Italiana d'Igiene (Milan).
Giornale di Medicina Veterinaria (Turin).
Malaria e Malattie dei Paesi Caldi (Rome).
Moderno Zooiatro (Bologna).
Nuovi Ercolani (Milan).
Pathologica (Genoa).
Propaganda Antimalarica (Naples).
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Riforma Medica (Naples).
Rivista Critica di Clinica Medica (Florence).
Rivista Pellagrologica (Udine).
Lo Sperimentale (Florence).

BELGIUM.

Annales de Médecine Vétérinaire (Ixelles-Brussels).
Bulletin de l'Académie Royale de Médecine de Belgique (Brussels)

HOLLAND.

Janus (Leyden).

GREECE.

Archives de Médecine (Athens).
La Grèce Médicale (Athens).

SPAIN.

Boletin del Instituto Nacional de Higiene de Alfonso XIII. (Madrid).

PORTUGAL.

Archivos de Hygiene e Pathologia Exoticas (Lisbon).
Archivos do Instituto Bacteriologica Camara Pestana (Lisbon).
Bulletin de la Société Portugaise des Sciences Naturelles (Lisbon).
Medicina Contemporanea (Lisbon).

SWITZERLAND.

Schweizer Archiv für Tierheilkunde (Zurich).

AMERICA.

CANADA.

Canadian Medical Association Journal (Toronto).

UNITED STATES.

American Journal of Public Health (New York).
American Journal of Veterinary Medicine (Chicago).
American Society of Tropical Medicine: Collected Papers.
Archives of Internal Medicine (Chicago).
Bureau of Animal Industry Bulletins (Washington).
Hygienic Laboratory Bulletins (Washington).
Index Medicus (Washington).
Interstate Medical Journal (St. Louis).
Journal of the American Medical Association (Chicago).
Journal of Experimental Medicine (New York).

UNITED STATES—*continued.*

Military Surgeon (Washington).
New Orleans Medical & Surgical Journal.
New York Medical Journal.
Proceedings of the United States National Museum (Washington).
Public Health Reports (Washington).
Public Health Bulletins (Washington).
Southern Medical Journal (Nashville, Tenn.).
Studies from the Zoological Laboratory, University of Nebraska.
Texas State Journal of Medicine (Fort Worth).
United States Naval Medical Bulletin (Washington).
University of California Publications in Zoology (Berkeley).
University of Illinois: Contributions from the Zoological Laboratory.

CENTRAL AMERICA.

Proceedings of the Canal Zone Medical Association (Mount Hope, C.Z.).

SOUTH AMERICA.

Memorias do Instituto Oswaldo Cruz (Rio de Janeiro-Manguinhos).
Revista Medica de S. Paulo (S. Paulo).
La Semana Médica (Buenos Ayres).

ASIA.

INDIA.

Indian Medical Gazette (Calcutta).
Indian Medical Record (Calcutta).
Medical Missions in India (Pokhuria).
Paludism (Simla).
Scientific Memoirs by Officers of the Medical & Sanitary Departments of the Government of India (Calcutta).

CHINA.

China Medical Journal (Shanghai).

EAST INDIAN ARCHIPELAGO.

Bulletin of the Manila Medical Society (Manila).
Geneeskundig Tijdschrift voor Nederlandsch-Indië (Rijswijk-Batavia)
Philippine Journal of Science, Section B. Philippine Journal of Tropical Medicine (Manila).

INDO-CHINA.

Bulletin de la Société Médico-Chirurgicale de l'Indochine (Hanoi & Haiphong).

AFRICA.

Archives de l'Institut Pasteur de Tunis.
Bulletin de la Société Médicale de l'Ile Maurice (Mauritius).
Nyasaland Sleeping Sickness Diary (Zomba).
Records of the Egyptian Government School of Medicine (Cairo).
South African Medical Record (Cape Town).
Transvaal Medical Journal (Johannesburg).

AUSTRALASIA.

Australian Medical Journal (Melbourne).
Australasian Medical Gazette (Sydney).
Bulletin of the Northern Territory (Melbourne).
New Zealand Medical Journal (Wellington).

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BUREAU NOTICES.

Sleeping Sickness Bulletins Nos. 1–4 are out of print, and Nos. 33–40 are very scarce. Copies of these numbers will be gladly received at the Bureau.

Works in the Bureau Library may be consulted between 10 and 5.30.

The Director can be seen between 10 and 1; for a later hour an appointment should be made.

The Director will be glad to receive early copies of works or reprints on Tropical Diseases for notice in the *Bulletin* and for the Library. To be addressed—Tropical Diseases Bureau, Imperial Institute, London, S.W.

(Telephone :—Kensington, 743.)

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